



AIR MINISTRY — DIRECTORATE OF CIVIL AVIATION

REPORT ON THE PROGRESS OF CIVIL AVIATION

(April 1st, 1926—December 31st, 1926.)

*Presented to Parliament by
Command of His Majesty.
April, 1927.*

LONDON:

PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE.

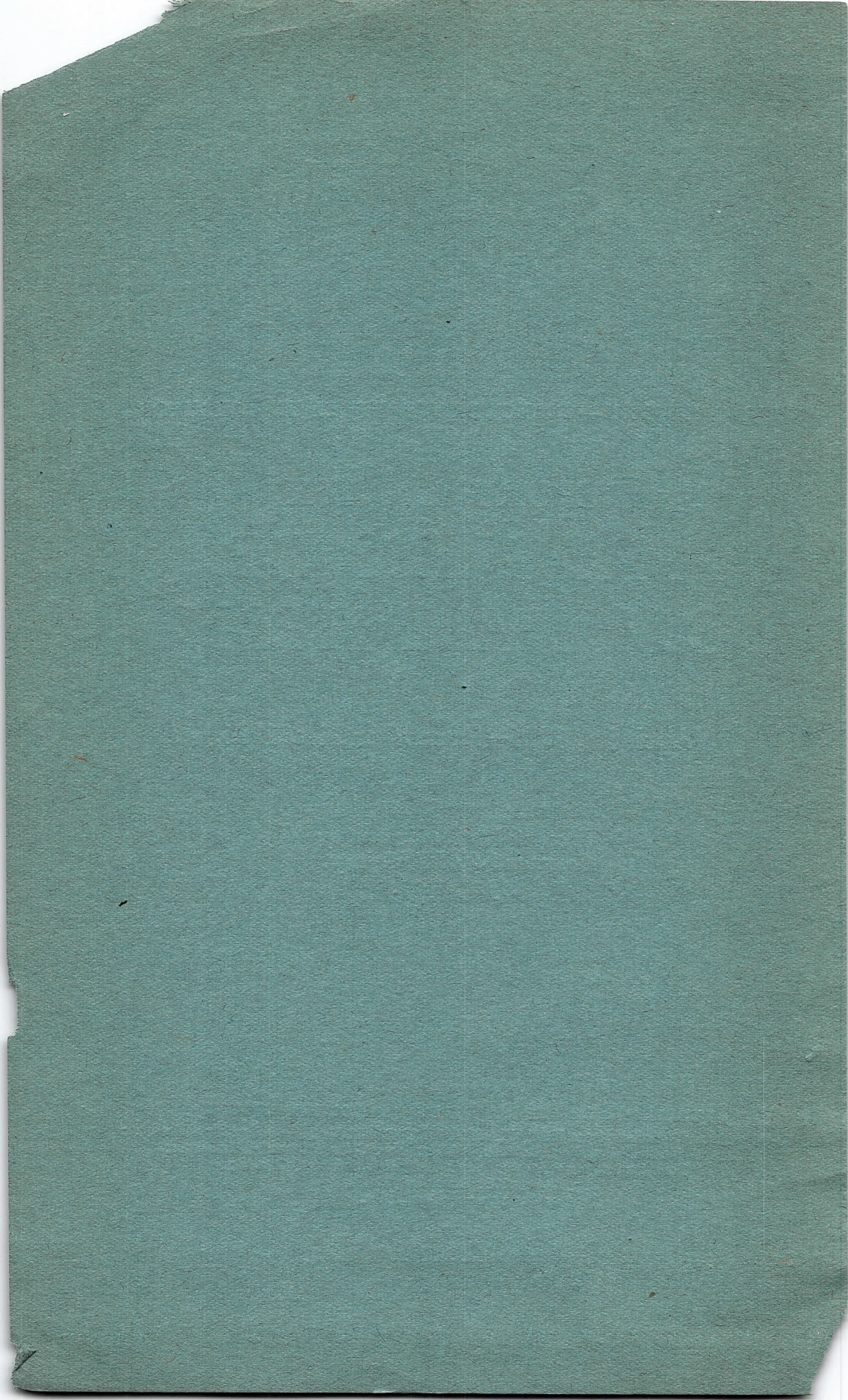
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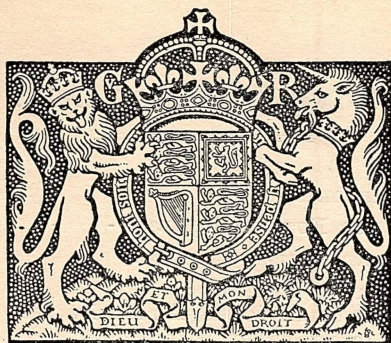
1927

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	PAGE
LIST OF PREVIOUS REPORTS - - - - -	4
CHANGE OF PERIOD FOR FUTURE REPORTS - - - - -	4
PART I.—GENERAL AND BRITISH EMPIRE :	
Relations with Foreign Countries :	
International Commission for Air Navigation - - - - -	5
Temporary Agreements with Foreign Powers - - - - -	5
Imperial Conference - - - - -	5
Commercial Air Services :	
Imperial Airways, Ltd.—European Services - - - - -	7
Imperial Airways, Ltd.—Egypt—India Service - - - - -	8
Air Taxis, Ltd. - - - - -	9
Civil Aviation during the General Strike - - - - -	9
Savage Skywriting Company (and associated Companies) - - - - -	9
Air Survey and Photography - - - - -	9
Light Aeroplane Clubs and Private Flying - - - - -	11
University Air Squadrons - - - - -	12
Training of Reserve Officers - - - - -	12
Flight to India by Secretary of State for Air - - - - -	13
Other Long-distance Flights - - - - -	14
Air Races and Competitions - - - - -	14
Airships - - - - -	15
Estimates, 1926–1927 - - - - -	16
Air Navigation Regulations - - - - -	17
Licences and Certificates - - - - -	17
Ground Organisation :	
Air Ports and Landing Grounds (cross-Channel Routes) - - - - -	18
" " (Cairo-Karachi Route) - - - - -	18
Night Flying Equipment - - - - -	19
Navigation - - - - -	20
Information and Maps - - - - -	20
Wireless Communications - - - - -	20
Meteorology - - - - -	21
Technical Development :	
Aircraft - - - - -	23
Engines - - - - -	24
Miscellaneous - - - - -	25
Medical Services - - - - -	25
Investigation of Accidents to Civil Aircraft - - - - -	26
Statistics of Civil Flying—Summary - - - - -	29
Statistical Tables :	
A. British Commercial Aviation - - - - -	32
B. Horse-power Mileage, Passenger Mileage and Ton-Mileage flown by Imperial Airways, Ltd. - - - - -	33
C. Aircraft Flights and Passengers carried between Great Britain and the Continent - - - - -	34
D. (1) Value of Goods imported and exported by Aircraft - - - - -	35
(2) Value of Bullion and Coin of Gold and Silver Imported and Exported by Aircraft - - - - -	36
E. Efficiency of British Subsidised Air Services - - - - -	37
F. Causes of Involuntary Landings in respect of Flights by British Subsidised Air Services - - - - -	38
G. Accidents : Commercial Aviation - - - - -	39
H. Subsidised Light Aeroplane Clubs, 1926 - - - - -	40

	PAGE
The Dominions, India and the Colonies :	
Australia - - - - -	41
Canada - - - - -	42
South Africa - - - - -	44
India - - - - -	44
Kenya, Uganda and the Sudan - - - - -	45
West Indies - - - - -	46
PART II.—FOREIGN COUNTRIES :	
Europe :	
Austria - - - - -	46
Belgium - - - - -	47
Czechoslovakia - - - - -	47
Denmark - - - - -	48
Finland - - - - -	49
France - - - - -	49
Germany - - - - -	52
Holland - - - - -	55
Italy - - - - -	55
Norway - - - - -	56
Poland - - - - -	57
Soviet Russia - - - - -	57
Spain - - - - -	58
Sweden - - - - -	58
Switzerland - - - - -	59
Asia :	
Japan - - - - -	60
American Continent :	
Argentina - - - - -	60
Bolivia - - - - -	61
Brazil - - - - -	61
Chile - - - - -	61
Colombia - - - - -	62
U.S.A. - - - - -	62

LIST OF PREVIOUS REPORTS.

"Synopsis of Progress of Work in the Department of Civil Aviation, 1st May, 1919, to 31st October, 1919" (Cmd. 418, H.M.S.O., 2*d.*).

"Synopsis of Progress of Civil Aviation in Foreign Countries, up to 31st October, 1919" (Cmd. 476, H.M.S.O., 1*d.*).

"Half-Yearly Report on the Progress of Civil Aviation, 1st October, 1919, to 31st March, 1920" (Cmd. 800, H.M.S.O., 3*d.*).

"Half-Yearly Report on the Progress of Civil Aviation, 1st April, 1920, to 30th September, 1920" (Cmd. 1073, H.M.S.O., 4*d.*).

"Half-Yearly Report on the Progress of Civil Aviation, 1st October, 1920, to 31st March, 1921" (Cmd. 1342, H.M.S.O., 6*d.*).

"Half-Yearly Report on the Progress of Civil Aviation, 1st April, 1921, to 30th September, 1921" (Cmd. 1559, H.M.S.O., 3*s.*).

"Half-Yearly Report on the Progress of Civil Aviation, 1st October, 1921, to 31st March, 1922" (Cmd. 1710, H.M.S.O., 6*d.*).

"Annual Report on the Progress of Civil Aviation, April 1st, 1922, to March 31st, 1923" (Cmd. 1900, H.M.S.O., 9*d.* net).

"Annual Report on the Progress of Civil Aviation, April 1st, 1923, to March 31st, 1924" (Cmd. 2210, H.M.S.O., 1*s.* net).

"Annual Report on the Progress of Civil Aviation, April 1st, 1924, to March 31st, 1925" (Cmd. 2489, H.M.S.O., 2*s.* net).

"Annual Report on the Progress of Civil Aviation, April 1st, 1925, to March 31st, 1926" (Cmd. 2707, H.M.S.O., 2*s.* net).

CHANGE OF PERIOD FOR FUTURE REPORTS.

As it is considered that the usefulness of the Reports will be enhanced if the period which they cover is changed from the financial year to the calendar year, it has been decided to bring this change into effect as from the year 1927, and in consequence to present the present report for the nine months April–December, 1926.

PART I.—GENERAL AND BRITISH EMPIRE.

RELATIONS WITH FOREIGN COUNTRIES.

International Commission for Air Navigation.

The tenth session of the permanent International Commission instituted in accordance with Article 34 of the Convention for the Regulation of Aerial Navigation (Paris, 13th October, 1919) was held in Paris at the Japanese Embassy from 11th–15th May, 1926, as guests of the Japanese Government, and the 11th Session was held also in Paris at the French Ministry for Foreign Affairs from 3rd–5th November, 1926, as guests of the French Government.

The amendment of Article 5 of the Convention, concerning the flight over the territory of a contracting State by aircraft of a non-contracting State, became effective on 14th December, 1926, on the deposit of the outstanding ratification of the amending protocol by the Kingdom of the Serbs, Croats and Slovenes. The amendment of Article 34, providing for equality in voting on the International Commission for Air Navigation, also became effective on the same date for a similar reason. It is hoped that these amendments may result in the adhesion to the Convention of certain States which have hitherto refrained from adhering on account of the original terms of the Articles in question.

Provisional Agreements with Foreign Powers.

Provisional air traffic agreements with the States named in the last Report (Denmark, Holland, Norway, Sweden and Switzerland) are still in force. Negotiations for an agreement with Germany are in progress and in the meantime the temporary reciprocal arrangements continue under which Imperial Airways, Ltd., operate air services to Cologne and Berlin and the Deutsche Luft Hansa A.G. to Croydon.

IMPERIAL CONFERENCE, 1926.

The Imperial Conference at its opening meeting in London, on the 19th October, 1926, set up a special Sub-Committee to consider and report on the subject of "Imperial Air Communications." In order that the members of the Imperial Conference might be in a position to realise fully the situation of civil aviation in this country, the Dominions and other parts of the World, a memorandum entitled "The Approach towards a system of Imperial Air Communications" was prepared by the Air Ministry and distributed before the opening of the Conference. This memorandum, with the addition of a statement addressed to the Conference by the Secretary of State for Air and the full Report of the Sub-committee, has been published by H.M. Stationery Office (price 5s. net).

In their Report the Sub-Committee stated that they were convinced that the development of Imperial air communications

both by airship and aeroplane was of sufficient importance to merit the early and continuous attention of the Governments of the several parts of the Empire, and they therefore recommended that the Imperial Conference should place on record the following resolutions :—

“ The Imperial Conference, being impressed with the great benefits, both political and commercial, to be derived from the speeding up of Imperial communications by air—

“ (1) Takes note with satisfaction (a) of the prospective opening of a regular air service between Cairo and Karachi and an experimental service between Khartoum and Kisumu; (b) of the decision of His Majesty's Governments in Great Britain and in the Union of South Africa to carry out a series of experimental flights to connect so far as possible with this latter service; and (c) of the decision of His Majesty's Government in Australia to arrange for flights by the Royal Australian Air Force from Australia towards Singapore to link up with similar flights of the Royal Air Force from Singapore towards Australia.”

“ (2) Recommends that the development of other air services should receive the early consideration of the Governments concerned and that in this connection particular attention should be paid to the maintenance of existing and the construction of new aerodromes so far as local resources permit with a view to the ultimate creation of a complete system of Empire air routes.”

“ (3) In view of (a) the great potentialities of the airship and (b) the present lack of constructional and other facilities which must prove a serious obstacle to the early development of regular airship services—

“ Recommends that the Governments of the Dominions concerned and of India should examine the possibility of erecting nucleus mooring mast bases to be available for demonstration flights in 1928–29 by the two airships now under construction, and of instituting such preliminary meteorological investigations as may be necessary to facilitate these demonstration flights; and that His Majesty's Government in Great Britain should consider the erection of a second shed at the Royal Airship Works at Cardington.”

“ (4) Recommends that an Imperial Air Conference should be held in 1928—or 1929—the precise date to be determined later—at some suitable Imperial centre, to report progress and to consider what further action can be taken for the development of Imperial air communications; and takes note with appreciation of the invitation of the Dominion of Canada that this Conference should take place in Canada.”

Finally, the Sub-Committee were of opinion that the present system of communicating information in regard to civil aero-

nautics should be continued and recommended that, with a view to ensuring still closer co-ordination throughout the Empire, exchanges should be effected from time to time between the Civil Aviation officials of Great Britain and the Dominions and India so far as limitations of staff and local considerations permit.

The recommendations made in the report of the Sub-Committee were unanimously adopted by the Imperial Conference at its Fifteenth Meeting on 19th November, 1926.

It is of interest that in a memorandum presented by the Empire Press Union to the Committee on Imperial Communications (other than Air Communications), the Empire Press Union took the opportunity of stating that it regards the development of air communications within the Empire as an important factor of Empire unity from the standpoint of press communications alone. The memorandum explains that at present the lapse of time between telegraphed press reports and the full and considered description and comment sent by mail is too great; the "news" element has often been destroyed in the interval. The Union looks to the coming air mail as a means of changing this situation to a large extent.

On 23rd October, 1926, members of the Imperial Conference attended an Inspection of Royal Air Force and commercial aircraft and equipment held at Croydon aerodrome. Examples of many types of landplanes were on view, displays were given of flying and wireless direction-finding and exhibits were arranged to show the progress made in air survey, metal construction and the working of the meteorological service. The ease of handling a light aeroplane was demonstrated by a woman pilot.

COMMERCIAL AIR SERVICES.

Imperial Airways, Ltd.—European Services.

The following services were operated by the Company during the period under review :—

	<i>Summer.</i> (May to September.)	<i>Winter.</i> (October to December.)
London-Paris - - - - -	Thrice daily.	Daily.
London-Paris-Basle-Zurich - - - - -	Daily.	—
London-Ostend - - - - -	Daily.	—
London-Brussels-Cologne - - - - -	Twice daily.	Daily.
London-Amsterdam (until October 15) - - - - -	Daily.	—
Southampton-Channel Islands - - - - -	Weekly.	Weekly.

In addition, occasional flights were made from Amsterdam to Hanover and Berlin, and from Amsterdam to Brussels and Cologne. Imperial Airways, Ltd., by arrangement with the Deutsche Luft Hansa A.G. of Berlin temporarily ceased to operate their London-Amsterdam service on the 15th October, 1926, and the operation of this service was undertaken by the German Company.

During the year Imperial Airways, Ltd., have completed, in accordance with the terms of their agreement, a total horse-power mileage of 549,139,440 and a mileage of 732,980, the monthly totals being :—

1926.	<i>Machine Mileage.</i>	<i>Horse-Power Mileage.</i>
January - - - -	34,435	16,329,300
February - - - -	40,260	21,353,900
March - - - -	55,635	31,022,775
April - - - -	55,265	34,879,250
May - - - -	81,430	59,799,750
June - - - -	88,750	73,269,650
July - - - -	107,355	84,515,230
August - - - -	107,605	85,722,465
September - - - -	67,180	58,620,350
October - - - -	39,605	34,949,900
November - - - -	30,025	24,500,420
December - - - -	25,435	24,176,450
	<hr/> 732,980	<hr/> 549,139,440

In addition, about 46,000 miles were flown by the company on special flights apart from the subsidised services.

A committee consisting of technical representatives of the Air Ministry and of Imperial Airways, Ltd., has been set up to study the problems of reducing costs which are constantly arising in the practical operation of aircraft. The Committee has already begun a detailed examination of a number of questions which urgently call for solution and it is hoped that as a result of its work considerably more rapid progress will be made in the elimination of excessive costs.

Imperial Airways, Ltd. Egypt-India Service.

The legal agreement with Imperial Airways, Ltd., for the operation of a fortnightly service between Egypt and India, on the terms outlined in the last report, was executed on the 28th October, 1926. The service is scheduled to commence with a flight from Basra to Cairo on the 7th January, and from Cairo to Basra on the 12th January. (These flights were duly completed on the 9th and 14th January respectively.) The operation of the Basra-Karachi section has been postponed till April, 1927.

Three De Havilland "Hercules" aircraft, 3 Jupiter engines, which were built for the operation of this service, were flown to their stations from England during December, 1926. One of these machines was used for the flight of the Secretary of State for Air to India, which is referred to in more detail on page 13. Two further machines will be flown out later.

The provision of the necessary ground organisation, though delayed by adverse circumstances, has made satisfactory progress, and on the section Cairo to Basra, all arrangements were complete

shortly after the end of the period under review. A brief summary of these arrangements will be found under "Ground organisation" on page 18.

Air Taxis, Limited.

A new company has been formed under the name "Air Taxis, Limited," to conduct special charter flying similar to that carried out successfully for some years by the De Havilland Hire Service. The organiser of this enterprise has acquired four aeroplanes and has two more on order from the De Havilland Company. This fleet will be based at Stag Lane Aerodrome. In addition to taxi work, the company will engage in air photography.

Civil Aviation during the General Strike.

The resources of civil aviation were drawn upon to assist in maintaining communications during the general strike in May last. The regular cross-Channel air services of Imperial Airways, Ltd., were unaffected and furnished a link with the Continent when other regular services had stopped. The remaining civil aircraft, including the "Moth" aeroplanes belonging to light aeroplane clubs, were organised for the distribution of newspapers and mails and for similar duties. In all 37 civil aircraft were employed in such operations, with 45 pilots. The work of the light aeroplanes was organised by the Royal Aero Club.

Savage Skywriting Company (and Associated Companies).

The Savage Skywriting Company has reconditioned its fleet in the United Kingdom and brought it up to a total of 12 machines. Owing to the general strike, however, the home programme arranged for 1926 had to be deferred until 1927. Operations in the United States, where 10 machines are based, are being continued with success. A contract has been arranged for a large campaign embracing three countries of Central Europe, and arrangements have been made for the introduction of skywriting into Australia. In addition, negotiations are in progress for displays in South Africa.

Major Savage, Managing Director of the Company, has lately carried out experiments on the problems of spraying crops with insecticide from the air, a subject which he originally studied in the United States. These experiments are incomplete, but are understood to have resulted in a new method that promises to yield considerable improvement in the efficiency of the spraying and to enable a much greater area to be sprayed during each flight than has hitherto been achieved.

AIR SURVEY AND PHOTOGRAPHY.

The period under review has witnessed a considerable awakening of interest in the commercial possibilities of air survey, some of the results of which have already manifested

themselves. Evidence is not lacking that the value of the services rendered is such that air survey will have no difficulty in standing on its own feet without extraneous aid, and it is hoped that the present forward movement is merely the beginning of a steady expansion of this important sphere of activity for commercial aviation.

The Air Survey Committee has continued to be of assistance in giving advice to commercial companies engaged in air survey. A report on "Flying for Air Survey Photography" has been prepared and is now in the press.

In connection with the visit of the Imperial Conference to Croydon, an exhibit was prepared jointly by the Aircraft Operating Co., Ltd. and the Air Survey Co., Ltd., to illustrate methods of survey from air photographs. This exhibit was subsequently removed to a room in the Air Ministry, Gwydyr House, where it remained for six weeks and attracted a great deal of attention from Imperial delegates, surveyors, forest officers, mining engineers, oil prospectors, traffic experts and the press. Enquiries were thereby set on foot that it is hoped may have definite results.

The Aircraft Operating Co., Ltd., during December, despatched an expedition to Northern Rhodesia to carry out a contract for a reconnaissance survey for Minerals Separation, Ltd. The area in which this company is interested is one of 52,000 square miles in a copper bearing region. The contract provides for the photography of 20,000 square miles of this territory and the preparation of maps of selected areas. It is believed that this is the largest commercial air survey contract which has yet been attempted.

The expedition consists of two pilots, three photographers and three mechanics; it is equipped with two D.H.9 aeroplanes with Nimbus engines, two Eagle cameras, and special navigation and photographic instruments. Among other instruments developed specially for this contract is an auto-focussing enlarger, which will materially speed up the production of scaled prints.

Aerofilms, Ltd., the subsidiary company of the Aircraft Operating Co., Ltd., have continued to expand their programme of commercial photography in this country, while acting as the photographic branch of the latter company. In spite of adverse weather and economic conditions, an increase of 20 per cent. in flying hours devoted to photography was achieved. 2,500 photographs were taken during the period of 9 months. The most interesting individual operation was the photography of 15 square miles of industrial country for the Rural District Council of Doncaster. The District Surveyor reports that, in transferring the results to the 1 : 2500 Ordnance Survey maps, the accuracy obtained is greater than that secured by plane tabling and that there has been a great saving of time and expense.

Other photographic work has been carried out for map revision and town planning schemes, for which purpose there is an increasing demand for air photographs. Air photographs have

been supplied to determine such questions as the adequacy of public houses in a district.

The Air Survey Co., Ltd., have expanded their organisation in the east and have opened a new department in London to deal with the mapping work in connection with their various contracts. The contract secured from the Sarawak Government for the mapping of the Rejang Delta, referred to in the previous report, was increased to cover an area of 2,100 square miles with the addition of other isolated small areas. The vertical photography of this area was completed in four months, in spite of unfavourable weather conditions. The region in question is well suited to air survey methods, consisting almost entirely of flat, heavily forested swamp jungle with cultivated clearings along the main waterways. One of the immediate results of the survey was the discovery that many of the native cultivators had taken much larger areas than the areas leased to them—a discovery which will have its effect on the revenue returns of the Government.

The photography for the survey of 400 square miles in the Federated Malay States was completed and certain other smaller survey contracts have been secured, including one for a large scale town plan of Penang. An expedition has also been sent to Chittagong in Bengal, where it is preparing for the survey of a number of areas for the Forest and Settlement authorities. The Company are devoting attention also to the problem of air transport in the region of the Straits Settlements; a number of individual transport flights having already been carried out.

The Central Aerophoto Company, Ltd., and the Surrey Flying Services, Ltd., have continued to carry out air photography for industrial and advertising purposes.

LIGHT AEROPLANE CLUBS AND PRIVATE FLYING.

The five Light Aeroplane Clubs approved under the Air Ministry scheme have continued the development of their activities during the period under review. A sixth Club, the Hampshire Aeroplane Club, whose headquarters are at Hamble, near Southampton, was approved in May, 1926. The total membership of the Clubs as at 31st December, 1926, was 1,058. 97 members held pilots' licences, of whom 55 qualified on Club aircraft. The amount of flying done by the Clubs is shown in the table on page 40. An official investigation has recently been carried out into the activities and financial position of the Clubs. The question of the necessity for further financial assistance on the expiry of the present agreements with the Clubs, is under consideration.

Apart from the six officially-assisted Clubs, six Clubs have been started independently, including the Private Owners' Club, to which reference was made in the last Report. The number of aircraft registered in the names of Clubs and "private" owners is increasing steadily. On 31st December, 1926, the total was 58, of which 32 were light aeroplanes and 26 other

types. These figures are exclusive of machines under construction. During the year the price of light two-seater aeroplanes has been appreciably reduced, with favourable results on the number of purchasers. Up to date about 70 "Moth" machines have been sold by the makers.

A new development in private flying was introduced when a private fleet of transport aircraft was organised in England on behalf of M. Lowenstein, a Belgian financier, for the conveyance of friends and business visitors to and from many parts of Europe.

UNIVERSITY AIR SQUADRONS.

The establishment of University Air Squadrons at Oxford and Cambridge has importance to civil aviation not less than to the Royal Air Force, since these squadrons are intended to assist in spreading a knowledge of aeronautics among members of the Universities who will follow a non-military calling equally with those who will adopt a service career.

The squadrons bear some resemblance to the Officers Training Corps and work in the closest touch with it, but they are essentially different; there are no drill parades and uniform is not worn. During spare time in University terms, courses of practical instruction are given in aircraft rigging, engine overhaul and assembly, air photography, navigation, wireless telegraphy and kindred subjects. During the long vacation the squadrons are attached to some Royal Air Force station for a fortnight, during which members are given instruction in the air and gain practical experience of the handling and maintenance of aircraft on the ground. In the case of Cambridge, the proximity of the R.A.F. station at Duxford affords facilities for a limited amount of flying during University terms. The present membership of the squadrons is 50 each.

TRAINING OF RESERVE OFFICERS.

The flying training of officers of the R.A.F. Reserve has continued at the five civil schools engaged in this work, under the new agreements entered into on 1st April, 1925. The following statement indicates the number of full courses completed at each school between 1st April, 1926, and 31st December, 1926 :—

<i>Name of School.</i>	<i>Courses Completed.</i>
De Havilland Aircraft Co., Ltd. - - -	88
Bristol Aeroplane Co., Ltd.- - -	64
Wm. Beardmore & Co., Ltd. - - -	64
Sir W. G. Armstrong Whitworth Aircraft, Ltd. - - - - -	57
North Sea Aerial and General Transport, Ltd.—	
Twin-engine Aeroplanes - - -	63
Seaplanes - - - - -	26

362

"Ab initio" training has continued at the schools controlled by the De Havilland Aircraft Co., Ltd., and the Bristol Aeroplane Co., Ltd. The number of courses under this category completed at each school during the period 1st April, 1926, to 31st December, 1926, is as follows :—

De Havilland Aircraft Co., Ltd. - - - -	14
Bristol Aeroplane Co., Ltd. - - - -	17
	<hr/>
	31

An "ab initio" course involves 30 hours flying training (dual and solo) on a Preliminary Training type of aircraft (De Havilland "Moth," or Bristol Preliminary Training Biplane) and at least five hours solo flying on an advanced training type (Bristol Advanced Training Biplane, D.H.9 or D.H.9 J).

No fatal accidents or accidents involving serious injury to Reserve Officers or Instructors have occurred during the period under review.

FLIGHT TO INDIA BY SECRETARY OF STATE FOR AIR.

The inaugural flight over Imperial Airways' route from Egypt to India was made by the Secretary of State for Air, who, accompanied by Lady Maud Hoare, left Croydon on the 27th December in one of the "Hercules" aircraft with which the service will be operated. In the same aircraft travelled Air Vice-Marshal Sir Geoffrey Salmond, proceeding to India to take over the command of the Royal Air Force in that country. The flight was completed on the scheduled date after the close of the period under review. The itinerary is given below :—

27th December	-	Croydon-Dijon-Marseilles.
28th	"	Marseilles-Pisa-Naples.
29th	"	Naples-Malta.
30th	"	Malta-Khoms-Benghazi.
31st	"	Benghazi-Sollum-Aboukir.
1st January	-	Aboukir-Ziza.
2nd	"	Ziza-Rutbah Wells-Baghdad.
3rd	"	Baghdad-Basra-Bushire.
4th	"	Bushire-Lingeh-Jask.
5th	"	Delayed at Jask.
6th	"	Jask-Pasni-Karachi.
7th	"	Karachi-Jodhpur.
8th	"	Jodhpur-Delhi.

Very bad weather was experienced on the early part of the route, yet, except for a delay at Jask, where a sandstorm of wholly exceptional severity necessitated a return to the aerodrome on the 5th January, the flight was carried out according to schedule. Since a day's delay at Karachi had been allowed in the programme, the arrival at Delhi took place at the scheduled time.

It is worthy of note that the machine on this flight carried a full load of passengers and baggage. The arrangements for the

flight were greatly facilitated by the valuable assistance rendered by the authorities of the various countries passed over, particularly France and Italy.

OTHER LONG DISTANCE FLIGHTS.

Flight to Australia and Back.

A flight was carried out by Sir A. J. Cobham from Rochester to Melbourne, Australia, commencing on 30th June, and arriving at Melbourne on 15th August. The return flight was commenced on 29th August, and finished at London on 1st October. The aircraft used was the identical D.H. 50 machine which had been flown by Sir Alan Cobham with the Director of Civil Aviation to India and back and again used on the flight to Cape Town and back. On this occasion it was fitted with a 385 h.p. "Jaguar" engine and with floats in place of a wheel undercarriage as far as Port Darwin.

The primary object of the flight was to survey the route from the point of view of its possibilities for ordinary commercial air traffic. The total distance flown was approximately 28,000 miles, the longest flight ever accomplished by a British aircraft using the same engine throughout.

His Majesty the King honoured Sir Alan Cobham by conferring on him the decoration of a Knight Commander of the British Empire.

Flight to Cairo and back.

With a view to testing the endurance of the Bristol Series VI "Jupiter" engine, an attempt was made by Colonel Minchin, with Mr. Mayer as passenger to fly a Bristol "Bloodhound" machine fitted with an engine of this type from London to Cairo in two days.

The machine left Croydon on 30th June and reached Brindisi the same day. The second day the machine, owing to unavoidable delay at Brindisi, was forced to land at Mersa Matruh for the night, the flight being completed by 6.30 a.m. the following day, i.e., 50½ hours after leaving Croydon.

Light Aeroplane Flight to India.

On 15th November two members of the Lancashire Light Aeroplane Club, Mr. Stack and Mr. Leete, left Croydon to fly to India. The machines used were two De Havilland "Moths" of standard type, but fitted with extra tank capacity. They arrived at Karachi on the 8th January, 1927, and are continuing the flight eastward. This flight constitutes a record for light aeroplanes.

AIR RACES AND COMPETITIONS.

The Lympne Light Aeroplane Meeting took place in September. For the prizes offered by the proprietors of "The Daily Mail" there were sixteen entries. The rules limited entrants to two-seater machines with engines not exceeding 170 lbs. in weight,

and the machines had to be fitted with dual control. The competition consisted of eliminating tests and a series of flights extending over a distance of 1,994 miles in six days, from 12th to 18th September. The routes were so arranged as to touch at the principal seaside resorts on the south coast.

The winner of the first prize was the competitor who succeeded in covering the course with the highest "figure of merit" as to useful load carried and petrol consumption. Nine machines qualified and five completed the course. The first and second places were won by Hawker "Cygnet" machines and third place by the Bristol "Brownie," each fitted with a Bristol "Cherub" III engine, 36 h.p. The "figure of merit" of the first "Cygnet," piloted by Flight Lt. P. W. S. Bulman, M.C., A.F.C., was 2,203 (pound-miles per pound of fuel), which is equal to about $7\frac{1}{2}$ ton-miles per gallon of petrol, at a speed of over 65 m.p.h.

Four other events were held on 18th September at the Lympne Meeting, the chief of which was the fourth contest for the Grosvenor Cup. The winner this year was Squadron Leader W. H. Longton, D.F.C., A.F.C., who flew a Blackburn "Bluebird," 75 h.p. Siddeley "Genet" engine, attaining a speed of 84.95 m.p.h.

The handicap race for the King's Cup, over a course of 1,464 miles, was held on 9th and 10th July and was won by Captain H. S. Broad, A.F.C., flying a De Havilland "Moth," 60 h.p. "Cirrus" engine, at a speed of 90.4 m.p.h.

A successful two-days' air race meeting was held at the Ensbury Park Racecourse, Bournemouth, on 21st-22nd August, four races being run on each day. This meeting was well attended and created interest in a neighbourhood in which aeronautical activities had lately been lacking.

Interest in air racing throughout the country has also been aroused by the meetings organised by the Light Aeroplane Clubs. Three clubs—Yorkshire, Newcastle, and Lancashire—have held Races or Displays and the results have been very valuable in attracting new members to the Clubs, apart from adding to the keenness of the existing members and interesting the public.

Proposals are being considered by the Royal Aero Club and other parties concerned for a considerably larger programme of air races in the coming year, when it is hoped that a still stronger impetus will be given to the movement for raising air racing to a leading place among national sports.

AIRSHIPS.

After the completion of the full scale aerodynamic experiments which were carried out with R. 33 at the close of 1925, the airship was deflated and was not again prepared for flight until September, 1926. The analysis of the pressure plotting experiments with R. 33 was completed in the early summer of 1926, and showed that the full scale results agreed generally with those obtained in

model experiments in a wind tunnel. This result means that the designers of the two new airships R.100 and R.101 can now accept with much greater confidence as a basis of design the calculations of aerodynamic forces based on experiments in the wind tunnel.

In July, a complete section of R. 101 (the airship which is being built at the Royal Airship Works, Cardington) was erected and submitted to stringent tests with satisfactory results. These tests represented the end of the period of preliminary research and experiment and the way is now clear for construction to proceed in accordance with the results obtained. The construction of R. 100 by the Airship Guarantee Company has been proceeding during the year at Howden, Yorkshire; and it is hoped that both airships will undergo their flying trials in 1928.

R. 33 was recommissioned in September, 1926, for further experiments in carrying and releasing aircraft, and for testing the masthead gear of the new mast at the Royal Airship Works. On 21st October, R. 33 left Pulham Airship Station for Cardington, carrying two Gloster "Grebe" aircraft, both of which were successfully launched in the course of the flight, one over Pulham, and the other over Cardington. The Dominion Premiers visited the Royal Airship Works in November and inspected the test section of R. 101, witnessing a short flight by R. 33 with the two single-seater fighters attached. Subsequently, after satisfactory tests of the mast-head gear, R. 33 returned to Pulham for deflation. On the return flight the launching experiments with the "Grebe" machines were repeated with complete success.

On the works side, the shed and mooring mast at Cardington have been completed and considerable progress has been made with the overseas bases in Egypt and India. The mast at the former station is completed; the erection of the airship shed at the latter station is well in hand.

The recommendation of the Imperial Conference that the Dominions should consider the possibility of erecting at their own expense mooring masts suitable for accommodating the new airships, for the purposes of demonstration flights to be carried out in 1928-29, has already been acted upon by the Dominion of Canada and the Union of South Africa, which have each undertaken to erect a mast. Representatives of the Airship and Meteorological Staff of the Air Ministry are accordingly being sent to Canada and South Africa, and also to Australia, to investigate possible sites for bases. The question of erecting a second shed at Cardington, as also recommended by the Imperial Conference, is now being considered.

ESTIMATES, 1926-1927.

(NOTE.—Particulars of the Air Estimates for 1926, relating to the financial year April 1st, 1926, to March 31st, 1927, were given in the last Report.)

AIR NAVIGATION REGULATIONS.

The Air Navigation Directions, 1926 (A.N.D.6) were issued on 30th October, 1926, amending in certain respects and consolidating in one publication various Directions issued during the years 1922-25, namely :—A.N.D.3, 3a, 3b, 3c, 3d, 3e and 3f concerning the registration of aircraft, the issue of airworthiness certificates and the licensing of personnel, &c.

LICENCES AND CERTIFICATES.

The following table shows the licences and certificates issued during the nine months under review and also during the whole of 1926 :—

	New Licences or Certificates Issued.		No. of Licences or Certifi- cates current on 31st Dec. 1926.
	Nine months ended 31st Dec., 1926.	Twelve months ended 31st Dec., 1926.	
Licences for Pilots - - - -	127	137	286
Licences for Navigators - - -	6	6	10
Ground Engineers - - - -	56	69	360
Certificates of Registration :			
Heavier-than-air Craft - - -	83	104	268
Lighter-than-air Craft - - -	5	5	15
Certificates of Airworthiness :			
Heavier-than-air Craft - - -	117	155	236*
Lighter-than-air Craft - - -	—	1	1
Licences for Aerodromes - - -	115	148	41

* This figure includes 69 Certificates of Airworthiness for aircraft known to have been sold abroad.

During the period under review the number of pilots' licences issued shows a marked increase over last year, the increase being due to a considerable extent to licences being obtained by members of Light Aeroplane Clubs. It is of interest that the medical examination required for the renewal of a Class "A" pilot's licence has been abolished. This relaxation of the regulations was promulgated in Air Navigation Directions (A.N.D.6) in November.

Of the 268 aeroplanes and seaplanes registered on 31st December, 1926, 216 machines, totalling 50,355 normal horse-power, were in civil employment and the remainder were experimental machines of military types in the hands of constructors.

The majority of the 115 new aerodromes licensed during the nine months ended 31st December, 1926, were sites used temporarily for "joy-riding." The 41 aerodrome licences shown in the table as current on the 31st December, 1926, comprised :—

Aerodromes for public use (Government owned)	-	5
Aerodromes for public use (privately owned)	-	11
Aerodromes for "joy-riding" (privately owned)	-	25

GROUND ORGANISATION.

Air Ports and Landing Grounds.

Cross-Channel Routes.

The erection of the hangars and the Administration Block at Croydon Aerodrome is proceeding satisfactorily. Hangar A, except for minor details, is complete, and will be occupied in February, 1927. Hangar B is not so advanced but it is expected to be ready for occupation in the early autumn of 1927. With regard to the Administration Block, the steel framework and wall foundations are complete and the walling and flooring is well in hand. Demolition of the buildings at present in use will commence as soon as the new buildings are ready for occupation. In connection with the Air Ministry (Croydon Aerodrome Extension) Act, 1925, the work on the new road is practically complete and Plough Lane will be closed to traffic, other than traffic proceeding to the aerodrome, some time in 1927.

Proposals are under consideration for the erection of a hotel on the northern side of the Administration Block, and negotiations are proceeding satisfactorily.

Cairo-Karachi Route.

As regards the ground organisation of the Cairo-Karachi route, it will be convenient to summarise at this point the arrangements made both for landing stations and for wireless and meteorological services. The latter will be referred to again in subsequent sections.

At *Heliopolis* the R.A.F. aerodrome, wireless station and meteorological station are being used. In addition the Air Ministry has provided a hangar and workshop and stores accommodation.

At *Gaza* a new aerodrome site has been acquired by Imperial Airways, Ltd. The Air Ministry has provided a hangar and a wireless and meteorological station to be operated by the Company, who have, in addition, erected accommodation for their passengers and staff.

At *Ziza* the Royal Air Force landing ground is being used but no facilities are provided, other than bulk petrol store and picketing arrangements by Imperial Airways, Ltd. Wireless and meteorological service will be provided by the Royal Air Force station at Amman.

At *Rutbah Wells* a landing ground has been prepared near the police post recently erected by the Iraq Government as a motor mail halt in the middle of the desert. This post is equipped with a wireless station and the Iraq Government will provide a wireless and meteorological service for aircraft. Bulk petrol storage and picketing arrangements have been provided by the Company.

At *Baghdad West* the Royal Air Force emergency landing ground has been equipped as an aerodrome. A hangar has been provided by the Air Ministry; accommodation for personnel has been provided by Imperial Airways, while the wireless and meteorological service will be provided by the Royal Air Force station at *Hinaidi*.

At *Shaibah* (Basra), the Royal Air Force aerodrome, wireless station and meteorological station are being used. A hangar has been provided by the Air Ministry and accommodation for personnel has been provided by the Company.

The organisation in the Persian Gulf is still under consideration, but at *Karachi* the Indian Government have now assumed responsibility for the provision of the aerodrome and the necessary ground organisation, consisting of hangar and wireless and meteorological stations. The site finally selected is on a portion of the airship station. Work is proceeding both on the part of the Indian Government and Imperial Airways, Ltd., who, as at other stations, are providing accommodation for personnel and petrol storage.

An officer of the Civil Aviation Department was appointed Superintendent of the route and took up his duties in November.

Night Flying Equipment.

The position with regard to the lighting of the Continental air route has for the time being become more stabilised. No important changes have taken place during the period under review. It is becoming more and more evident that the Néon form of beacon will prove the most suitable for air navigation, and in time it may be necessary to substitute beacons of the new type for the existing lights with optical systems. Comparative tests of different types of Néon tubes are about to be made to decide on the most efficient type, and the equipping of *Lympne* aerodrome with a Néon beacon is delayed, pending the completion of these trials.

Preliminary experiments with a Néon tube sunk in the ground at *Croydon* aerodrome are in hand, and at the same time experiments are being instituted with a view to producing an automatically controlled generating plant for the operation of Néon beacons in situations where current is not available from local sources of supply. The outcome of these experiments may have a considerable bearing on the lighting of the Egypt-India air route.

Arrangements are being made for the control of the obstruction lights on the wireless masts at Croydon by means of a sun valve, an arrangement which may later be extended to the lights on other W/T masts. The floodlight at Croydon aerodrome is to be converted into a mobile unit, using a Kegresse tractor mounting an electric generator. The arc lamp will be replaced by a new design of gas-filled lamp now being evolved, which gives equal illumination and greater reliability with a considerable reduction of working cost. Suitable lighting systems are being devised for the illumination of wind cones and ground signals. Work is in progress on the unmasking on the landward side of the marine lights at Dungeness and South Foreland, in order that they may be of assistance to aircraft flying towards the coast from inland.

Full scale trials of the leader cable are proceeding at the Royal Aircraft Establishment, but conclusive results are not yet available.

Navigation.

The International Commission for Air Navigation has adopted the new rules with regard to the examination and carriage of licensed navigators. These rules, which had been under discussion for some time, come into force on the 1st January, 1928. Examinations based on the new conditions have been continued, and further lectures in navigation and meteorology given at Croydon aerodrome. A number of pilots qualified at the last examination as 2nd class navigators.

The revision of the list of instruments and navigation equipment required to be carried by aircraft has now been effected in Air Navigation Directions A.N.D.6.

Information and Maps.

The Air Ministry gazetteers of ground organisation and topographical data, which are continually being revised and amplified, continue to be of considerable assistance to both Service and civil pilots as well as to foreign pilots when organising special flights.

The Baluchistan General Sheet of the International Aeronautical Maps is now in the advanced proof stage and will shortly be placed on sale. It has been decided also to place on sale to the public, with certain modifications, the special edition of the $\frac{1}{4}$ inch to the mile Ordnance Survey sheets of the British Isles (excluding Ireland), prepared for the Royal Air Force.

Wireless Communications.

Owing to the steady increase in air traffic in Europe the use of radio-telephony on civil aircraft, as from the 1st of January, 1927, is limited to aircraft capable of carrying 5-9 persons, including the crew; those aircraft capable of carrying 10 or more persons will, as from that date, use wireless telegraphy and a special operator will be carried.

Work is progressing on the construction of the new wireless stations at Croydon aerodrome. Direction-finding receivers of the most modern pattern will be situated in the new control tower, and receivers for route traffic signalling with other air ports will also be installed in the administration block. The various transmitters for these services will be grouped in one main transmitting building at some point a few miles outside the aerodrome, with remote control from their respective receiving stations. This arrangement will permit simultaneous working on different wave-lengths without mutual interference.

The aerodrome wireless station at Lympne has been re-equipped with modern apparatus, including a direction-finding receiver of the same type as that in present use at Croydon, and work is progressing on the modernisation of the Pulham station.

The stations at Croydon, Lympne and Pulham maintain a constant watch for aircraft from dawn to dusk and are always ready, during this time, to render immediate direction-finding assistance to any aircraft upon demand. The cost of these three stations for personnel and maintenance is approximately £10,000 annually.

The Air Ministry civil aviation wireless station at Longerich Aerodrome, Cologne, was closed in August upon the opening of a German station capable of performing the same duties.

A chain of wireless stations between Cairo and Karachi—comprising existing R.A.F. stations and additional Air Ministry civil aviation stations—has been organised and will be ready for service when the route is opened. The Karachi terminus will be equipped by the Indian Government to communicate both with the aircraft of Imperial Airways, Ltd., and with airships when airship flights to India are started.

A sub-committee of the Imperial Communications Committee of the Committee of Imperial Defence, composed of technical representatives of interested Government Departments, commercial firms and amateurs, has completed, under the chairmanship of the Head of the Signals Branch, Air Ministry, draft British Technical Wireless Regulations, October, 1926. These regulations have been approved in draft form by the Imperial Communications Committee and include the regulations applicable to aircraft services which have been prepared by Signals Branch, Air Ministry, and constitute the basis of Air Navigation Directions on this subject shortly to be brought into force.

Meteorology.

The general arrangements for the supply of meteorological information for civil aviation remain unchanged, but further improvements have been made in details.

A new feature, which was introduced in October, is the issue of altimeter correction charts to pilots flying from Croydon, on days when the error due to atmospheric conditions is likely to exceed 200 feet and when fog or low cloud exists or is likely to develop on the route. A new system of ground signals, con-

forming to the scheme recommended by the International Commission for Air Navigation, was brought into operation at Lympne aerodrome in July. The signals denote to pilots flying on the regular air route the height of the lowest cloud, the visibility and the weather at Croydon, Biggin Hill and St. Inglevert respectively.

Another improvement, introduced in December, is a pictorial method of exhibiting at Croydon aerodrome the hourly weather reports from stations on the air routes. The new system, which is also based on the recommendation of the International Commission for Air Navigation, consists of two large maps of North-West Europe on which the state of the weather, extent and height of the lowest cloud and the visibility at the different stations at two consecutive hours of observation are shown by coloured signs.

The hourly reports of visibility over the Channel received from the coast-watching station at Hythe were discontinued on 1st September and replaced by similar reports from Dymchurch. The arrangements for the supply of meteorological information on the Southampton-Guernsey air route have continued on the lines of the preceding year without any important modification.

Increased advantage has been taken of the facility by which any pilot can obtain, on request, from the Aviation Forecast Service at the Air Ministry at any time during day or night, a weather report and forecast for flying in any part of the British Isles or along the main Continental air routes: 412 such requests have been dealt with, among which may be mentioned the following instances (*a*) flights during the general strike in May in connection with the distribution of newspapers, (*b*) a flight from Croydon to Milan on May 4th, (*c*) a flight from Biarritz to Berne on August 25th, and (*d*) a light aeroplane flight from Lands End to John O'Groats on September 29th.

During the period under review, investigations have been carried out in respect of the following routes or areas:—

Khartoum-Kisumu.

Calcutta-Rangoon.

The West Indies and the northern coast of South America.

Cairo-Karachi (Wind data and meteorological conditions from the point of view of artificial lighting).

Berehaven-Bristol.

In conjunction with the Director General, Indian Meteorological Department, a considerable time has been devoted to the organisation of the meteorological arrangements along the Cairo-Karachi air route. Personnel of the operating company who are to act as meteorological observers at auxiliary reporting stations in Palestine, Iraq and along the Persian Gulf have been trained at Croydon, and arrangements have been made for the supply of the necessary instrumental equipment for these stations. Memoranda have been prepared on the minimum meteorological organisations necessary for the safeguarding of projected air routes in the West Indies, between Calcutta and Rangoon, and between Bristol and Berehaven. Arrangements have also been

made for the loan of instruments for the measurement of upper winds on the Khartoum-Kisumu air route.

Special meteorological arrangements were made in connection with the flight from England to Australia and back organised by Sir Alan Cobham, and also the flight of the Secretary of State for Air to India in one of the "Hercules" machines, with which must be included the two earlier flights of "Hercules" aircraft to Cairo and Basra respectively. Rather more general arrangements were made in connection with the flight from England to India in December of two light aeroplanes.

As in previous years, special arrangements were made for the supply of weather reports and forecasts in connection with the King's Cup Race in July and the Light Aeroplane Competition held at Lympne in September. Special arrangements were made also in connection with the Gordon Bennett balloon race in May.

TECHNICAL DEVELOPMENT.

The past year has been marked by the introduction of aircraft built in accordance with the revised policy of increasing the reserve of engine power available, as a measure for procuring greater safety. Previously, the tendency has been to reduce the engine power available per passenger carried, but the development of the modern air-cooled engine with its low weight for horse power has enabled commercial aviation to reap the advantages of increased power without serious increase of weight. It is indeed doubtful whether any economic loss is actually sustained, as the greater reserve of power available in the new aircraft, compared with earlier designs, reduces the frequency of overhauls and consequently the running expenses. The modern three-engined aircraft has the further advantage that with one engine out of commission it has sufficient power to maintain flight, and with only one engine running its glide is gentle, tending to reduce in a great measure the danger of a forced landing.

The development of metal construction, and of methods of protecting metal against corrosion, are steadily proceeding.

The improvement of control is receiving constant attention; but the problem is so complex that definite progress is necessarily slow. In addition to the development of normal types of aircraft, the possibilities of the autogyro and the tailless aircraft are being investigated, as control at low forward speeds is one of the fundamental claims for these types of aircraft.

AIRCRAFT.

Amongst the types of three-engined commercial aircraft produced this year are the following :—

- (1) The Armstrong Whitworth "Argosy" (3 Jaguar engines) has been developed for the cross-Channel services, and three machines are now in use by Imperial Airways, Ltd.

(2) The De Havilland "Hercules" (3 Jupiter engines) has been purchased by Imperial Airways, Ltd., for the Cairo-Karachi service and three aircraft have been delivered. It is of interest to note that one of this type, within two days of leaving the contractors' works and with practically no previous flying, flew from Croydon to Karachi to schedule time excepting one stop necessitated by violent sandstorms. This fact indicates the general reliability which is being achieved in the design and construction of modern civil aircraft.

(3) The Handley Page "Hamlet" with slotted wings has been completed as an experimental small type. It is now being rearranged and fitted with two "Lynx" engines for further experimental work.

The following new types are under construction:—

(1) Two large three-engined boat seaplanes with accommodation for 15 passengers. These aircraft are of all metal construction and are fitted with Jupiter engines.

(2) A twin-engined boat seaplane for the Channel Islands-Southampton service.

(3) A freight-carrying landplane. Although a large reserve of power and high cruising speed are desirable for passenger service, for normal freight carrying more economical methods can be used. The freighter now being built carries a maximum paying load per horse power but maintains engine reliability by having a low economical cruising speed. The cabin is arranged to accommodate normal freight of practically any description.

A new specification is being discussed which covers all available knowledge on commercial passenger types and in which it is hoped to make very considerable progress in eliminating noise in the passenger cabin and in minimising the amount of time the aircraft is out of commission owing to necessary repair and maintenance work.

The technical investigation of aircraft for Certificates of Airworthiness has covered 76 aircraft during the past year, of which 28 were new type designs and 28 were modified types, the remainder being investigated for subsequent modifications or for competition purposes.

ENGINES.

Experiments are being made to obtain a satisfactory reducing gear for air-cooled radial engines in order to increase the crankshaft speed and consequently the power, without detriment to propeller efficiency. Experimental models of two types of gear have given satisfactory results and progress is being made in this direction which will be of especial importance for commercial aircraft.

A heavy oil engine using compression ignition is now on the test bench and development is actively proceeding on this type of engine.

MISCELLANEOUS.

Ground Equipment.—Development work in connection with ground equipment for flying in fog or at night continues to make progress. Particulars of this work have already been given under the heading "Night Flying Equipment" (page 19).

Full scale trials of the leader cable system are proceeding at Farnborough. The instruments are successful in giving steering and height indications, and trials of aircraft flying to these indications are now in progress.

Radiogoniometry.—By co-operation between the Air Ministry, Imperial Airways, Ltd., and the Marconi Wireless Telegraph Co., Ltd., a series of test flights has been made to determine the practicability in commercial air transport of the R.A.E. wing coil and the Marconi Bellini-Tosi systems of direction finding. Promising results were obtained, but further development is still necessary. It was apparent that the "homing" method, for which the R.A.E. apparatus is constructed, is preferable for use on the European air routes, while the Bellini-Tosi system offers advantages for long distance routes operated by aircraft carrying a larger crew than is usual in Europe.

Anti-Stall gear has passed into the service trial stage. When these tests are complete it should be possible to decide whether this device is suitable for civil aircraft in general.

The Schilovsky-Cooke Turn Indicator has undergone considerable modification, and should prove valuable for night or fog flying. The instrument weighs under 3 lb. and occupies less than 5 square inches of space on the dashboard. It is electrically operated; and if, for example, the aircraft turns off its course to port, a band of red light $\frac{3}{4}$ inch deep appears, its width indicating the rate of turn. An illuminated "cross-level" of a mechanical type is also incorporated. This and the gyro are damped by pneumatic dashpots which can be adjusted in the air. The lamp can be varied for brightness and can readily be replaced without unshipping the instrument; luminous markings are, however, provided as an additional precaution. The whole device is in a spring mounting, so that at any time its correct functioning can be instantly tested by pressure to one side. Extended trials are to be given to this indicator, and a number have been ordered for the purpose.

MEDICAL SERVICES.

Questions relating to the medical aspects of civil aviation continue to be dealt with satisfactorily under the supervision of the Director of Medical Services.

The period under review shows, proportionally, a marked increase in the number of medical examinations carried out for

Class "A" (private) licences—the figures of the previous period having been more than doubled. The progress of the Light Aeroplane Club movement has largely accounted for this.

There is also a marked increase in the number of examinations carried out for Class "B" (public transport) licences. In a recent report on the "Health of civil aviators who have flown regularly for the past two years" it was shown that the average Physical Efficiency Index for all pilots, irrespective of the nature of their employment, was 45 out of a possible 50. The conclusion to be drawn from the data thus obtained is that the regulations at present in use serve to ensure a high standard of fitness.

Owing to the absence of signs of deterioration it was possible to recommend the amendment of the Air Navigation Directions as regards the re-examination of pilots after 250 hours' flying (should this occur before the termination of six months). It was shown that the six-monthly examination would have served equally well, and it is now proposed to hold a special re-examination only when 100 hours' flying have been accomplished in any thirty consecutive days or under.

At the suggestion of the British Delegation, the regulations for "B" licence pilots have been amended by the International Commission for Air Navigation so as to enable military pilots to receive special consideration when the exact medical requirements are not fulfilled.

The question of granting "B" licences to women has been under consideration and, after investigation, it has been decided to issue licences for this country on the same standards of general physical efficiency as for men. Special requirements appropriate to the sex are laid down, and the medical re-examination will be every three months instead of every six months. It is expected that these regulations, proposed by the British, will be accepted by the International Commission for Air Navigation at an early date.

The ventilation of aircraft has received consideration, and suggestions for more efficient ventilation have been put forward. In anticipation of the forthcoming activity in regard to airships, details are under discussion concerning medical examination and standard of fitness required for the operating crew.

INVESTIGATION OF ACCIDENTS TO CIVIL AIRCRAFT.

BRITISH AIRCRAFT.

The record of accidents in civil aviation for the nine months ending 31st December, 1926, is not so satisfactory as that of the previous twelve months, but, having regard to the circumstances and nature of the more recent accidents, it may be said that progress towards safety in air transport has been maintained. Only one serious mishap occurred on the British established air routes.

During the period under review, there were altogether thirteen accidents to which the Air Navigation (Investigation of Accidents) Regulations, 1922, were applicable. Eight resulted in loss of life, but only half this number were cases of aeroplane crash, the cause of each of the other fatalities being unprecedented in records of British civil aviation. The most serious accident involved a captive balloon. The other five accidents had no serious consequences beyond damage to the aircraft.

The one case in which an aeroplane was wrecked when carrying fare-paying passengers occurred when, for the first time on record, an aeroplane belonging to Imperial Airways, Ltd., was forced to alight on the sea owing to engine failure. None of the occupants of the aeroplane was injured and all were rescued before the machine sank.

Causes of Accidents.

With one exception (the case of engine failure over the Channel) each of the accidents to aeroplanes was, in the opinion of the Inspector of Accidents, due solely to an error of judgment on the part of the pilot concerned.

The circumstances which led to the accidents, under the various branches of aviation, were briefly as follows :—

1. *Subsidised Air-Transport Services.*—On a journey from London to Paris a sudden and complete failure of the starboard engine occurred when the aeroplane was nearly half-way across the Channel and the pilot was forced to alight on the sea. A good “landing” was made, no one being injured by the shock of impact with the water, and before the whole of the machine became submerged, the pilot, the mechanic and ten passengers were rescued. The aeroplane finally sank and was lost.

2. *Passenger Flight (“Joy-ride”) Services.*—(1) During an exhibition flight, the pilot accidentally stalled the aeroplane and got into a spin from which he failed to recover in time to prevent the machine striking a tree and finally crashing to the ground. The pilot was killed and one passenger (the owner of the aircraft) was seriously injured. The other passenger escaped injury.

(2) About 1½ hours after starting on a cross-country flight in very bad weather, the aeroplane was seen circling round, some distance off its proper course, as if the pilot had lost his way. The engine was running satisfactorily. The aeroplane was then over high ground which was enveloped in clouds, visibility being not more than 100 yards. Just after levelling-up from a sharp turn to the left, the aeroplane stalled and fell to the ground from a height of about 50 feet. Fire occurred on impact and the pilot and the two passengers (non-paying) were killed.

(3) The pilot, in avoiding a collision with some trees when taking-off from a licensed aerodrome, accidentally stalled his machine. The aeroplane pancaked heavily on to the ground

and was badly damaged, but the pilot and passenger (mechanic) escaped injury.

(4) During the course of a flight, which included certain aerobatic manœuvres, a passenger was killed by falling out of the aeroplane. Although each seat of the aeroplane was equipped with a safety-belt, the passenger was not strapped-in before the commencement of the flight.

(5) While an aeroplane was being taxied past the public enclosure of a licensed aerodrome one of the wing-tips of the machine came into collision with the railings of the enclosure. This caused the aeroplane to swing round, and a child, who was sitting on the top of the railing, was struck and fatally injured by the airscrew.

(6) Owing to the life-line of a parachute becoming disconnected from the body-harness at or about the time of a jump from an aeroplane, a young woman, who was attempting a parachute descent for the first time, was killed. It is not improbable that a button of the parachutist's coat caught in and operated the quick release mechanism.

3. *Light Aeroplane Clubs.*—(1) Owing to an error of judgment on the part of the pilot when manœuvring to land, the aeroplane stalled and fell to the ground. The pilot, who was the only occupant of the aeroplane, escaped injury.

(2) The pilot accidentally stalled his machine (a small monoplane) when attempting to fly at slow speed and at a very low height past a cinematograph camera on the ground. The aeroplane struck the ground nose first and the pilot was killed.

(3) The pilot, on a solo flight, misjudged his approach to the aerodrome with the result that the aeroplane struck a wire fence and turned completely over. The pilot was unhurt.

(4) Following an aerobatic manœuvre, which was carried out by the pilot at a low altitude, the aeroplane stalled and fell into a spinning nose-dive from which it failed to recover completely before striking the ground. The passenger, who was in the front cockpit, was killed, and the pilot was seriously injured.

(5) Owing to an error of judgment on the part of the pilot, when taking off on a solo flight, the aeroplane collided with the boundary fence of the aerodrome. The machine was wrecked but the pilot was uninjured.

4. *Lighter-than-air Craft.*—A spherical balloon, anchored by a cable and winch, was being flown at a charity fête under somewhat unfavourable weather conditions. During a descent (haul-down by means of the winch only) the captive balloon was struck by a rain squall and blown over to an angle of about 45 degrees, whereupon the net started to break, and a few moments later the gas-bag escaped through a large rent in the net. The basket and rigging fell to the ground from a height of about 50 feet and the pilot and four passengers were killed.

This aircraft was being flown in contravention of Air Navigation Orders, and the accident must be attributed to the net of the balloon being subjected to stresses it was not designed to withstand.

FOREIGN AIRCRAFT.

There were two very serious accidents to foreign aircraft in this country during the period under review. Both occurred on the Paris-London air route, and involved the same type of French machine. The circumstances were as follows :—

(1) The aeroplane left Paris in good weather but encountered bad conditions over the Channel. Flying below the clouds in heavy rain the aeroplane crossed the English coast at a height of a few hundred feet. On reaching the higher ground, which at that time was enveloped in very thick mist, the pilot turned back, and, with the engines shut off, glided down towards a large field. In a final manœuvre, preparatory to landing, the aeroplane came into collision with the roof of a farm building and crashed to the ground. The pilot, mechanic and two of the thirteen passengers were killed; nine other passengers were injured, four cases being serious; and two escaped injury.

(2) An outbreak of fire occurred when the aircraft was flying at an altitude of about 2,000 feet. A sheet of flame appeared to come from the port top engine (four-engined aeroplane) and envelop the tail of the machine. The pilot brought the aeroplane down under control but with flames round the back portion of the fuselage, until it was about 100 feet from the ground. The tail then dropped suddenly and the aeroplane assumed a steep climbing attitude, after which it fell over and crashed to the ground. The pilot, mechanic and the five passengers were killed. The wreckage of the machine was gutted by fire.

As a result of the investigation after the accident, the Inspector of Accidents arrived at the following conclusions :—

(a) That one of the connecting rod bearings (big-end) of the port top engine broke up during the flight, owing to a defect in the lubrication system.

(b) That under the influence of vibration and consequent stresses on the wing structure, resulting from the mechanical breakdown of the engine, the port top petrol tank sprang a heavy leak at the soft-soldered joint round a "Rip-panel" or emergency vent in the bottom of the tank sump. The pilot subsequently operated the "Rip-panel" in order to empty the tank as quickly as possible.

(c) That the escaping petrol, falling on an exhaust pipe, became ignited by the exhaust gases, and the tail unit of the aeroplane was partly destroyed by fire before the machine reached the ground.

SUMMARY OF STATISTICS.

Statistics of civil aviation in 1926 and previous years are given in the tables on pages 32-40.

Table A.—In view of the introduction of statistics of air transport passenger-mileage and ton-mileage (Table B) it has been found possible to simplify and improve Part I of Table A, relating to air transport flying. The columns for machine flights and machine mileage remain unchanged and are comparable for all the independent periods shown. The column for passengers carried, however, is not comparable throughout, since the totals quoted for 1925 and 1926 represent the actual numbers of individuals carried instead of, as in previous periods, the numbers of persons carried over each stage of a route. The column for goods carried also differs. The figures in this column for 1925 and 1926 represent the total paying cargo carried, that is, goods, mails and excess baggage. Prior to 1925, the totals do not include excess baggage, nor do they include a small amount of goods carried between aerodromes on the Continent.

A comparison of the figures for 1925 and 1926 (on the revised basis) shows the large increase in traffic carried by Imperial Airways, Ltd., in 1926. 16,775 passengers and 679 tons of goods were carried in 1926 as against 11,193 passengers and 550 tons of goods in 1925. The mileage flown was again less than in the previous year as a consequence of the replacement of single-engined aircraft by twin and three-engined machines of greater carrying capacity.

To assist comparison of passenger traffic it may be mentioned that the figures for passengers "by stages" in 1925 and 1926 were 14,068 and 20,367 respectively and that the number of individual passengers in 1926—16,775—was therefore higher than the number of passengers "by stages" in 1925.

Other flying for hire, mainly joy riding, in Part II of the table, was once more greater in amount than in any previous year, with 215,000 miles flown and 81,909 passengers carried. So far as reported the total number of persons who, since 1919, have been taken up as passengers in this branch of civil flying now amounts to 390,116; many others have not been reported.

Table B.—This table, an addition to those given in previous reports, sets out in detail the traffic conducted by Imperial Airways, Ltd., in units of horse-power-miles, passenger-miles, and ton-miles. The progressive improvement in the company's operations is clearly shown. In 1926 as compared with 1925 passenger-mileage increased by 41.6 per cent. and goods ton-mileage by 7.7 per cent., whilst total ton-mileage increased by 28.6 per cent., and horse-power mileage (miles flown \times engine power) by 21.4 per cent.

Table C compares traffic carried across the Channel by British aircraft with that carried by foreign aircraft, and indicates that the British share of the traffic, which had declined to 51 per cent. in 1925 when the British fleet was inadequate, is rising again to its former level; it stands at 61 per cent. for 1926. The total number of passengers carried by British and foreign air lines to and from the Continent now amounts to 109,634 in five years and four months.

Tables D (1) and (2) show respectively the value of ordinary merchandise and of bullion and gold and silver coin imported and exported by air. It is interesting to note that imports of ordinary goods in 1926 were smaller than in 1925, but that exports were substantially larger and the total amount was therefore again higher than in any previous year. The carriage of bullion and gold and silver coin by air appears to be well established. In 1925, the value carried was £10,040,399, and in 1926, £8,283,498. Exports formed the bulk of this traffic.

Table E.—The efficiency of Imperial Airways' services is now given not only on the basis of the flights commenced, as in previous reports, but also in relation to the flights scheduled. In 1926 the flights scheduled numbered 4,374, of which 374 were cancelled, 3,715 (85 per cent.) were completed without interruption and 3,954 (90 per cent.) were completed with or without interruption. This result was a considerable improvement on the previous periods included in the table. Of the 4,000 flights commenced in 1926 the proportion completed with or without interruption was 99 per cent.

Table F analyses the causes of involuntary landings on the established air routes. As in 1924 and 1925 the factor responsible for about 50 per cent. of cases of involuntary landings was bad weather whilst engine or installation failure accounted for 33 per cent. of cases and other reasons for the balance. Since involuntary landings are roughly trebled in winter as compared with summer, owing chiefly to fog, the large improvement in reliability that will be gained from a solution of the fog problem is evident.

Table G.—Accidents in Commercial Aviation. In view of the development of private flying it is desirable to point out that this table relates to air transport and other flying for hire. Tabular statistics of accidents to aircraft not carrying paying passengers, including Club aircraft, have not been compiled, but particulars of such accidents are included elsewhere in the report (pages 27–28).

For the second consecutive year British air transport has a record of no accidents resulting in death or injury, and the accident rate since the services began in 1919 is therefore still further improved. A total distance of 5,271,000 miles has now been flown with only four accidents causing the death of passengers. This is equivalent to one such accident in a distance flown corresponding to 52 times round the world at the equator.

One accident to a fare-paying passenger occurred in other flying for hire. This was the first fatality for five years in "joy ride" flying and was due to the passenger falling out of the machine.

Table H.—This table has been added to illustrate the membership and work of the officially-assisted Light Aeroplane Clubs. The total amount of flying carried out up to the end of 1926 amounted to 12,551 flights and 5,085 hours.

TABLE A.
BRITISH COMMERCIAL AVIATION.
(May, 1919, to December, 1926, inclusive.)

Period.	PART I.					PART II		
	§ Air Transport (Internal and Continental).					* Other Flying for Hire.		
	Machine Flights.	Machine Mileage.	Passengers carried.	Cargo carried (tons).		Machine Flights.	Machine Mileage.	Passengers carried.
January, 1926	-	-	-	-	-	782	5,000	1,358
February	199	35,000	296	29.4	-	1,933	11,000	3,071
March	213	40,000	347	26.2	-	2,468	10,000	4,889
April	302	57,000	719	40.4	-	5,484	26,000	9,894
May	297	57,000	1,155	39.4	-	5,006	24,000	9,175
June	728	130,000	2,040	103.8	-	5,624	27,000	10,525
July	541	98,000	2,275	73.5	-	5,351	27,000	10,636
August	668	116,000	3,119	85.6	-	7,797	35,000	16,525
September	727	117,000	3,243	86.4	-	4,312	23,000	8,472
October	486	85,000	1,790	63.9	-	2,620	16,000	4,878
November	249	43,000	969	50.9	-	937	6,000	1,611
December	196	34,000	443	39.8	-	529	5,000	925
December	171	28,000	379	39.7	-			
Total, year ending 31st December, 1926	4,777	840,000	16,775	679.0	-	42,843	215,000	81,909
Total, year ending :—								
31st December, 1925	4,424	862,000	11,193	550.0	-	33,061	169,000	66,503
31st December, 1924	4,859	936,000	13,601	542.8	-	23,491	137,000	43,621
31st December, 1923	4,765	943,000	15,552	328.1	-	20,114	108,000	34,683
31st December, 1922	3,625	717,000	10,393	214.6	-	14,009	127,000	25,933
31st December, 1921	993	225,000	5,256	19.4	-	22,159	226,000	37,424
31st December, 1920	2,854	644,000	5,799	137.0	-	23,949	315,000	36,497
† 31st December, 1919 (8 months)	467	104,000	870	30.0	-	34,953	494,000	63,546
Total : May, 1919, to December, 1926	26,764	5,271,000	—	—	-	214,579	1,791,000	390,116

* Prior to 1922, "Other flying for hire" includes a small amount of private flying (*i.e.*, not for hire or reward). The statistics are compiled from returns rendered voluntarily by the various firms; some firms, however, have not rendered returns. A separate table is given (Table H, page 40) of flying by Light Aeroplane Clubs.

† Air Transport (Part I.) commenced in August, 1919, and Other Flying (Part II.) in May, 1919.
§ See notes on pages 29-30.

TABLE B.
HORSE-POWER-MILEAGE, PASSENGER-MILEAGE AND TON-MILEAGE FLOWN BY IMPERIAL AIRWAYS, LIMITED.

Period.	Horse-power-miles.	Pasenger-miles.	Goods Ton-miles.	Pasenger-Ton-miles.	Total Ton-miles.
1926.					
January	16,329,300	67,315	7,109.41	6,010.27	13,119.68
February	21,353,900	79,490	6,237.67	7,097.32	13,334.99
March	31,022,775	160,805	9,696.14	14,416.88	24,113.02
April	34,879,250	264,035	9,613.91	23,574.55	33,188.46
May	59,799,750	474,530	19,704.93	42,368.75	62,073.68
June	73,269,650	523,615	16,530.78	46,751.34	63,282.12
July	84,515,230	704,395	21,197.17	62,892.41	84,089.58
August	85,722,465	702,970	19,711.71	62,765.18	82,476.89
September	58,620,350	411,365	16,805.06	36,729.01	52,534.07
October	34,949,900	189,070	12,422.45	16,881.25	29,303.70
November	24,500,420	93,640	9,637.49	8,360.71	17,998.20
December	24,176,450	74,865	10,364.02	6,684.37	17,048.39
Total: 1926	549,139,440	3,746,095	159,030.74	334,532.04	493,562.78
Total: 1925	421,154,575	2,645,275	147,566.96	236,185.25	383,752.21
Total: Nine months, Apr.-Dec., 1924	365,604,385	2,481,992	129,066.52	221,582.80	350,649.32
Grand Total: 1st April, 1924—31st December, 1926	1,335,898,400	8,873,362	435,664.22	792,300.09	1,227,964.31

TABLE D (1).
 VALUE OF GOODS (a) IMPORTED INTO THE UNITED KINGDOM BY AIRCRAFT; (b) EXPORTED AND RE-EXPORTED FROM THE UNITED KINGDOM BY AIRCRAFT.
 (August, 1919, to December, 1926, inclusive.)

Period.	Imports from				Exports and Re-exports to					
	Belgium	France.	Nether-lands.	Other Countries.	Total.	Belgium.	France.	Nether-lands.	Other Countries.	Total.
January, 1926	£ 3,073	£ 38,346	£ 5,338	£ 2,840	£ 49,597	£ 248	£ 30,657	£ 2,241	£ 843	£ 33,989
February	2,764	43,394	1,383	717	48,258	20	150,002	2,319	658	152,999
March	6,800	79,309	2,600	3,788	92,497	910	209,053	1,749	1,076	212,788
April	7,072	53,626	2,534	8,321	71,553	267	27,257	1,681	1,075	30,280
May	6,806	55,512	7,803	9,912	80,033	776	40,716	5,506	3,253	50,251
June	7,018	75,591	12,504	7,626	102,739	1,025	81,041	2,822	3,208	88,096
July	4,373	69,549	2,529	9,588	86,039	1,934	38,365	8,076	11,726	60,101
August	2,807	52,569	1,603	7,188	64,167	1,539	12,330	3,032	4,924	21,825
September	4,404	77,114	2,356	14,085	97,959	721	36,905	2,711	6,589	46,926
October	5,936	75,006	3,830	10,142	94,914	422	77,101	3,454	6,596	87,573
November	6,281	79,282	4,426	10,090	100,079	740	142,763	5,084	9,979	158,566
December	4,063	55,681	4,883	5,775	70,402	425	14,751	5,001	2,432	22,609
Total, year ending 31st December, 1926	61,397	754,979	51,789	90,072	958,237	9,027	860,941	43,676	52,359	966,003
Total, year ending—										
31st December, 1925	25,111	850,533	37,060	270,471	1,183,175	7,208	248,142	26,761	121,650	403,761
31st December, 1924	12,654	706,120	36,284	86,757	841,815	15,195	332,971	27,869	133,110	509,145
31st December, 1923	3,053	466,336	37,033	60,881	567,303	3,708	152,255	26,445	36,540	218,948
31st December, 1922	3,497	410,573	35,586	3,721	453,377	7,726	222,666	28,299	952	259,643
31st December, 1921	6,671	359,291	8,471	941	375,374	4,265	171,403	19,316	833	195,817
31st December, 1920	2,578	661,563	2,648	10,130	676,919	25,781	270,980	44,210	4,297	345,268
31st December, 1919 (4 months)	178	59,654	1	6	59,839	9,582	21,514	—	1	31,097
Total: August, 1919, to December, 1926	115,139	4,269,049	208,872	522,979	5,116,039	82,492	2,280,872	216,576	349,742	2,929,682

NOTE.—Bullion and gold and silver coin are excluded. See table D (2).

TABLE D (2).

VALUE OF BULLION AND GOLD AND SILVER COIN IMPORTED
INTO, AND EXPORTED FROM, THE UNITED KINGDOM BY AIRCRAFT.

(January to December, 1925, and 1926.)

Country.	Imports from		Exports to	
	1925.	1926.	1925.	1926.
	£	£	£	£
Belgium - -	—	—	750	209,372
France - -	147,616	162,103	255,499	1,731,464
Netherlands -	58,226	68,749	3,699,963	1,623,502
Germany - -	—	1,695	591,210	2,749,099
Switzerland -	—	—	5,047,522	758,966
Other countries -	—	74,978	239,613	903,570
Total - -	205,842	307,525	9,834,557	7,975,973

TABLE E.

EFFICIENCY OF BRITISH SUBSIDISED AIR SERVICES.

This Table relates to flights on scheduled services only.

Period.	Total flights.						Scheduled flights. Percentage completed.		Flights commenced. Percentage completed.	
	Scheduled.	Cancelled.	Commenced.	Completed uninterrupted.	Completed after interruption.	Interrupted and not completed.	Without interruption. %	With or without interruption. %	Without interruption. %	With or without interruption. %
January-March, 1926	799	123	676	607	48	21	76	82	90	97
April-June, 1926	1,218	47	1,171	1,104	62	5	91	96	94	99
July-September, 1926	1,730	94	1,636	1,563	66	7	90	94	95	99
October-December, 1926	627	110	517	441	63	13	70	80	85	98
Total, 1926	4,374	374	4,000	3,715	239	46	85	90	93	99
January-December, 1925	5,018	932	4,086	3,724	304	58	74	80	91	99
April-December, 1924*	4,505	924	3,581	3,273	255	53	73	78	91	99

* Details not available before April, 1924, when Imperial Airways, Ltd., commenced operations.

TABLE F.
CAUSES OF INVOLUNTARY LANDINGS IN RESPECT OF FLIGHTS BY BRITISH SUBSIDISED AIR SERVICES.

Period.	Total flights commenced.	Cause of landing.				Percentage of total involuntary landings due to			Percentage of total flights commenced, interrupted, all causes.
		Weather.	Engine or installation failure.	Other reasons.	Total.	Weather.	Engine or installation failure.	Other reasons.	
						%	%	%	%
January to March, 1926	-	54	20	8	82	66	24	10	12
April to June, 1926	-	25	25	14	64	40	40	20	5
July to September, 1926	-	24	35	17	76	31	46	23	5
October to December, 1926	-	45	19	14	78	58	24	18	15
Total, 1926	-	148	99	53	300	49	33	18	7
Total, 1925	-	157	100	49	306	51	33	16	7
April to December, 1924	-	102	84	38	224	46	37	17	6

Notes.—(1) Landings for petrol or oil are not included.

(2) The flights in this table are all flights commenced whether or not on a scheduled service : the number of flights shown as commenced is therefore greater than the number shown in Table D which represents the efficiency of regular scheduled services only.

TABLE G.—ACCIDENTS : COMMERCIAL AVIATION.

(Heavier-than-Air Craft.)

(May, 1919, to December, 1926, inclusive.)

	May, 1919, to Dec., 1919.		January to Dec., 1920.		January to Dec., 1921.		January to Dec., 1922.		January to Dec., 1923.		January to Dec. 1924.		January to Dec., 1925.		January to Dec., 1926.	
	Air Trans- port.	Other Fly- ing.	Air Trans- port.	Other Fly- ing.	Air Trans- port.	Other Fly- ing.	Air Trans- port.	Other Fly- ing.	Air Trans- port.	Other Fly- ing.	Air Trans- port.	Other Fly- ing.	Air Trans- port.	Other Fly- ing.	Air Trans- port.	Other Fly- ing.
Passengers killed -	1	—	2	7	7	—	1	—	3	—	7	—	—	—	1	—
Passengers injured -	2	—	2	—	2	—	2	—	—	—	—	—	—	—	—	—
Passenger flights per passen- ger killed -	870	—	2,899	5,214	37,424	—	—	5,184	—	—	1,943	—	—	—	81,909	—
Passenger flights per passen- ger injured -	435	9,078	2,899	18,249	18,712	10,393	—	—	—	—	—	43,621	—	—	—	—
Crew killed -	2	—	2	—	2	—	2	—	—	—	—	—	—	—	—	—
Crew injured -	1	7	—	—	4	—	1	—	3	—	—	—	—	—	—	—
No. of accidents involving casualties :—																
Fatal -	2	2	1	3	2	1	—	1	—	—	1	—	—	—	—	1
Non-fatal, but resulting in injury to occupants -	—	8	1	8	4	1	—	2	—	—	—	—	—	—	—	—
Approximate machine miles per accident resulting in death or injury to occu- pants -	52,000	49,000	322,000	29,000	38,000	359,000	—	314,000	108,000	936,000	137,000	—	—	—	215,000	—
Machine flights per accident resulting in death or injury to occupants -	233	3,495	1,427	2,177	3,693	1,812	—	1,588	20,114	4,859	23,491	—	—	—	42,843	—

NOTES.—(1) The numbers of crew carried are not available.

(2) For the period May, 1919–December, 1921, other flying includes all flying other than Air Transport or competitive flying. For the period January, 1922–December, 1926, other flying is flying for hire or reward other than air transport or competitive flying.

(3) For details of accidents during 12 months, January–December, 1926, *vide* pages 27–28.

TABLE H.
SUBSIDISED LIGHT AEROPLANE CLUBS, 1926.

Club.	Average Membership.				Flights and Hours.										
	Flying Members.		Asso- ciates.		Total.	Members not qualified as pilots.				Members qualified as pilots.		Instructors (Flying as pilots but not as instructors).		Total.	
	Not quali- fied.	Qualified (A or B licences.)	Solo.	Dual.		Flights.	Hours.	Flights.	Hours.	Flights.	Hours.				
London : January to December, 1926 -	151	22	91	264		260	112	1,859	796	760	307	709	199	3,588	1,414
Hampshire : August to December, 1926 -	59	3	73	135		105	22	502	169	31	12	149	38	787	241
Lancashire : January to December, 1926 -	85	9	35	129		226	99	1,380	578	360	162	451	88	2,417	927
Midland : January to December, 1926 -	45	3	139	187		124	59	419	239	171	77	246	83	960	458
Newcastle-upon-Tyne : January to Decem- ber, 1926 -	69	10	45	124		115	59	1,196	607	520	280	249	78	2,080	1,024
Yorkshire : January to December, 1926 -	137	2	22	161		175	56	421	180	110	28	114	30	820	294
Total, 1926 -	546	49	405	1,000		1,005	407	5,777	2,569	1,952	866	1,918	516	10,652	4,358
†Total, 1925 -	477	12	291	780		137	54	1,224	552	68	27	470	94	1,899	727

NOTE.—In addition to the above, the following hours were flown on strike transport during May, 1926 : London, 98 hours ; Newcastle-upon-Tyne, 49 hours ; Lancashire, 25 hours.

† Membership on 31st December, 1925.

THE DOMINIONS, INDIA AND COLONIES.

AUSTRALIA.

The three Australian air services to which references have been made in previous reports have continued to give proofs of their safety and reliability and of their remarkable value in the development of the areas which they serve. Since their inception they have covered on regular flights alone a total distance of about 1,338,000 miles without serious accident apart from one which occurred on a preliminary flight over the first route. In addition to the scheduled route flights, a large amount of taxi work has been done and this also has been free from accident. A regularity of 100 per cent. is maintained practically continuously, the only exceptions being due as a rule to flooded aerodromes. Statistics of the past year's traffic are given in the accompanying table.

The contract of Western Australian Airways, Ltd., for the route Perth-Derby has been renewed for a further period of 3 years from 4th December, 1926, the subsidy being reduced to 3s. 4d. per mile for the first year of the new period, with possible further reductions thereafter. In December, 1923, the ensuing year's subsidy was fixed at 4s. per mile.

Between Perth and Carnarvon at the southerly end of this route traffic has so increased that the company proposes to institute early in 1927 a second service in each direction. No additional subsidy will be paid for this service, but the company hopes to receive the nett postal revenue from air mail surcharges.

The Charleville-Cloncurry-Camooweal service completed four years of contract flying on 1st November, 1926, up to which date it had flown 296,943 miles on the regular route, carrying 3,366 paying passengers, 33,336 lbs. of goods, and 65,561 letters. 99·2 per cent. of scheduled flights were completed, of which 94·97 per cent. were completed on time. The Queensland and Northern Territory Aerial Services, Ltd., the company responsible for the service in question, intends to organise shortly a daily air service from Brisbane to Toowoomba, without the assistance of a Government subsidy. This route of 77 miles takes from 4 to 5 hours by rail and can be flown in 45-50 minutes. Mails will be carried at a special low surcharge of 1d. per half oz., and the resulting nett revenue will be credited by the Post Office to the company.

The third service, Adelaide-Cootamundra with branches from Broken Hill to Mildura and Hay to Melbourne, has made good headway since the reorganisation in July, 1925, when the present routes were adopted in place of the Adelaide-Sydney route.

In anticipation of a call for tenders for the operation of a seaplane service between Victoria and Launceston (Tasmania) a new company entitled Tasmanian Air Services, Ltd., has been

formed at Melbourne with the co-operation of Pratt Brothers, aircraft constructors, of Geelong. The provision of a subsidy for an air service to connect Tasmania with the mainland has been under consideration by the Government for some time past and the route has been surveyed from the air. The present long sea journey from Victoria to Launceston would be reduced by aircraft to about 3 hours.

The light aeroplane club movement has taken firm root in Australia. In addition to two Clubs based at Sydney and Melbourne respectively (the New South Wales and Victorian sections of the Australian Aero Club), two further Clubs are being established, one by the South Australian section of the Australian Aero Club and the other by the Geelong Aero Club. A free issue of "Moth" light aeroplanes, and a bonus of £20 per graduated pilot, up to a maximum of 50 per annum, is granted to each club.

In districts where the formation and running of a club would present difficulties it has been decided to adopt a different organisation, under which the flying instruction will be in the hands of a commercial operator. In brief, it is proposed to take advantage of the skilled personnel and organisation at the disposal of the air line companies, together with the local interest in flying which they have aroused, by the establishment of flying training schools using light aeroplanes under the control of these companies. Four schools are projected, of which three, at Perth, Brisbane and Longreach respectively, are already approved and are preparing to commence training early in 1927. The fourth, probably to be based at Hay, is still the subject of negotiations. The companies concerned will provide their own equipment and will each be paid a bonus of £40 per graduate, up to a maximum of 50 per annum.

CANADA.

The development of Canadian civil aviation has continued along the lines already described in previous Reports. The principal operations are the protection of forests against fire, air survey and forest type sketching, which are conducted by the Royal Canadian Air Force on behalf of the Government Departments concerned, by the Government of Ontario Forestry Service and by private contractors. In 1926, the forest areas under organised air patrol amounted to 161 million acres, of which 105 million acres were in Northern Ontario, 53 million acres in Manitoba and 3 million acres in Alberta. In addition there was a further area in Quebec where forest fires were reported by aircraft, but the primary duty of the machines was type-sketching, exploration and transport. It is proposed to add a further 15 million acres of forest country in Northern Saskatchewan to the area patrolled by aircraft in 1927.

The aircraft operated on fire patrol duties in 1926 numbered 32, of which 16 were civil and 16 belonged to the Royal Canadian

AUSTRALIAN REGULAR AIR SERVICES, 1926.

Service.	No. of Flights.	Miles Flown.	Hours Flown.	Passengers carried per Single Stage.	Letters Carried.	Goods Carried.	Remarks.
Perth-Derby	1,001 (4,207)	159,532 (707,438)	2,116 (9,356)	1,214 (3,470)	*232,677 (860,769)	Lbs. 49,952 (77,006)	(From 5/12/21 to 31/12/26.)
Charleville-Camooweal	902 (3,109)	96,347 (312,248)	1,196 (4,007)	1,326 (3,577)	*21,980 (67,713)	15,064 (37,563)	(From 2/11/22 to 31/12/26.)
Adelaide-Cootamundra	1,364 (1,956)	162,085 (232,127)	2,154 (3,041)	1,223 (1,426)	*10,078 (15,272)	330 (365)	(From 21/7/25 to 31/12/26.)
Broken Hill-Mildura							
Melbourne-Hay							
Total, 1926	3,267	417,964	5,466	3,763	*264,735	65,346	
Adelaide-Sydney (Discontinued.)	(853)	(93,605)	(1,165)	(112)	(3,714)	(72)	(From 2/6/24 to 14/7/25.)
Grand Total	9,925	1,345,418	17,569	8,585	947,468	115,006	

NOTE.—The figures in brackets are totals from the inception of the services. For the period prior to 1926 certain revisions have been made and the figures differ slightly from those previously published.

* Letters carried up to 31st November, 1926 (11 months).

Air Force. The total civil aircraft registered in Canada numbered 44; civil pilots numbered 38; hours flown by civil aircraft totalled 5,860. The Royal Canadian Air Force employed approximately 34 aircraft and carried out 2,278 hours of flying in civil operations.

Air Survey has become an established part of the survey services of the Dominion and is taking an ever-increasing share of the annual survey programmes. During the past two years the area surveyed by the air method has been over 120,000 square miles.

SOUTH AFRICA.

There has been a considerable awakening of interest in aviation during the past year. The Aero Club of South Africa has been re-established and has begun an energetic campaign with the object of attracting public attention to the importance of aviation to the Union. One of the immediate aims of the Club is to organise a Light Aeroplane section on the lines of the British Light Aeroplane Clubs.

The offer of £8,000 as a Government subsidy for an air transport service is still maintained and several schemes have been under discussion. That which has taken most definite form is a proposal for a service between Walvis Bay (West Africa) and Johannesburg. Provided that arrangements could be made for mails from Europe to be landed at Walvis Bay instead of being taken on to Cape Town a saving of upwards of four days could be effected by this service in the delivery of the mails in many parts of the Union. The advantages of a service between Johannesburg and Durban are also recognised and a company is in course of formation with a view to opening up this route.

INDIA.

Towards the end of the year a memorandum was presented by the Indian Air Board to the Government of India reviewing the present situation of civil aviation and giving the views of the Board as to the steps that should be taken for the encouragement and assistance of civil air services with due regard to Indian interests.

Among recommendations of a general character, there were four upon which special emphasis was laid :—(a) that the Government should adopt the principle of subsidies for the operation of air transport in its early stages; (b) that the Government should be responsible for the provision of the necessary aerodromes and ground organisation as is the practice in other countries; (c) that the interest and support of Indians should be elicited by the investment of Indian capital in commercial air services and the training and employment of young Indian men in them; and (d) that a Directorate of Civil Aviation should be established under a Director, whose services would be obtained from the Air Ministry. A final recommendation urged that action should be taken speedily.

With regard to the England-India airship route, the Board recommended the acquisition of the site selected for an airship mooring mast at Bombay and also the transfer of the Government-owned Calcutta site from the military to the civil authorities.

On the question of internal aeroplane services, the Board considered that action was already overdue, and earnestly recommended that at least one service should be started without delay. A definite proposal was made for a service between Calcutta and Rangoon and it is upon this that the principal immediate interest of the memorandum is centred.

Nevertheless, the importance of surveying other routes and preparing plans for the establishment of aerodromes and landing grounds was stressed as a matter deserving immediate attention in view of the possibility of these routes being required in the comparatively near future. The more important routes were stated as likely to be:—Bombay-Calcutta, Karachi-Calcutta, Karachi-Bombay and possibly Karachi-Lahore and Northern India. Sites for seaplane bases have already been selected at Calcutta and Rangoon.

KENYA, UGANDA, AND THE SUDAN.

Arrangements have been completed for an experimental air service between Khartoum and Kisumu to be carried out early in 1927 by the North Sea Aerial and General Navigation Company, Limited, which is associated with the Blackburn Aeroplane and Motor Company, Limited. Under an agreement concluded on 30th November, 1926, the governments of Kenya and Uganda will each subscribe £2,500, and the Government of the Sudan £2,000 towards the expenses, and the company will defray the balance. Twelve experimental flights will be made in each direction in order to survey the route and gain the experience upon which plans for a permanent service can be formulated. A seaplane will be used and the route selected will follow the valley of the Nile from Khartoum as far as Lake Victoria Nyanza and there branch easterly to Kisumu, which is the terminus of the Kenya and Uganda Railway. The length of the route is 1,400 miles and it will be flown in two days. It is proposed that after the first flight the service will be run at intervals of about 12 days in each direction until about the end of May, with a break of a few weeks during March and April for the overhaul of the machine.

The service will not only bring Kenya Colony and Uganda into closer touch with England but will also improve the very poor local communications. Assuming that the normal boat and rail service from England to East Africa takes 20 days—and it should be remembered that no regular service is run—the saving in time gained by taking ordinary transport to Khartoum and thence going by air to Kisumu would be 8 days. Between

Khartoum and Uganda the saving of time by air transport would be from 10 to 12 days and between Khartoum and Rejaf at the southerly limit of the navigable Nile, 14 days.

Further stages of development are contemplated which will comprise eventually an air link between Cairo and Khartoum, saving a further two days on the journey from England to East Africa, and extensions southward with a view to connecting with services to Cape Town. As stated at the Imperial Conference, arrangements are being made to conduct a number of demonstration flights by Royal Air Force machines on the Cairo-Khartoum stage to connect, so far as Service exigencies permit, with the flights to Kisumu, and it is hoped that the South African Government will similarly be able to arrange at least one flight by a machine of the South African Air Force from Kisumu to Cape Town.

WEST INDIES.

The consideration of the opportunities for the operation of civil air transport in the neighbourhood of the West Indies was referred to a Committee appointed in the Air Ministry for the purpose. They have reported that a service throughout the West Indies is commercially impracticable at present owing to the comparatively small volume of traffic available and the consequential necessity for a large measure of financial assistance. Opportunities exist, however, for the establishment of local services on certain sections which offer good prospects of early commercial success, namely:—(a) an internal service in British Guiana; (b) a service between British Guiana and Trinidad; (c) a service between Trinidad and Barbados; and (d) a coastal service between Trinidad and Maracaibo via Curaçoa.

In British Guiana proposals are now on foot for the formation of a company to enable the private operations of the Real Daylight Balata Estates Ltd. to be extended.

PART II.—FOREIGN COUNTRIES.

EUROPE.

AUSTRIA.

The following services were operated during 1926:—

(1) *Vienna-Budapest*.—Operated by the Oesterreichische Luftverkehrs A.G. in conjunction with the Deutsche Luft Hansa A.G. and the Ungarische Luftverkehrs A.G. of Budapest.

(2) *Vienna-Graz-Klagenfurt-Venice*.—A new service opened on 25th August, 1926, by the Oesterreichische Luftverkehrs A.G., in conjunction with the Italian Società Transadriatica.

(3) *Budapest-Graz*.—Opened on 14th October, 1926, in order to link up Budapest with the Vienna-Venice line and thus form a direct connection between Hungary and Italy. So far, the flights over this route, which have been carried out by the Oesterreichische Luftverkehrs A.G., have been more or less experimental, but a regular service, operated jointly by the Austrian company and the Ungarische Luftverkehrs A.G. is planned for the spring of 1927.

(4) *Vienna-Innsbruck*.—Opened on 1st November, 1926, by the Oesterreichische Luftverkehrs A.G., in conjunction with a new company, the Tiroler Luftverkehrs A.G.

Complete statistics for 1926 are not available, but it is stated that the figures will show a considerable improvement over those for 1925. Owing to the increase in mail and goods traffic, it is planned to introduce the use of special freight machines on some lines during 1927.

BELGIUM.

In April the S.A.B.E.N.A. (Société Anonyme Belge d'Exploitation de la Navigation Aérienne) opened a new service from Brussels to London, *via* Ostend. This was operated daily, excepting Sundays, until September, when the service closed down for the winter.

The route operated by this company in Belgian Congo has been very successful, and is becoming more regularly used. The route was extended at the end of May last from Kinshasa to Boma and the complete route is now as follows:—Boma—Kinshasa—Bandundu—Ilebo—Luebo—Kanda Kanda—Bukama—N'Gule (Kansenia). Intermediary landings are occasionally made at Matadi, between Boma and Kinshasa.

The service is run at intervals of approximately three weeks, coinciding with the arrivals and departures of the Belgian steamship services between the Congo and Europe. During the first eight months of 1926, a total distance of 54,100 miles was flown and 491 passengers, approximately 25 tons of mails and 1½ tons of goods were transported.

The sum of 1,700,000 francs has been allotted for 1927 to Civil Aviation for the training of military pilots in Belgium. This sum is provided out of the Military Budget.

An Air Traffic Agreement has recently been concluded between Belgium and Germany.

CZECHO-SLOVAKIA.

The administration of civil aviation in Czechoslovakia is in the near future to be placed under the control of an Air Department; up to the present it has been controlled by the Ministry of Public Works. The financial Vote for civil aviation in 1926 showed a big increase over the previous year, namely 30,704,000 kr. as against 14,618,340 kr.

The State air line, Prague—Bratislava—Kosice, was again operated regularly, and in addition, a service, operated twice daily in each direction, was opened in July between Prague and Brno. The statistics for the State air lines for 1926 as compared with 1924 and 1925 are as follows :—

	1924.	1925.	1926.
Number of miles flown - - - -	126,400	175,760	148,125
Goods carried (tons, approx.) - -	2	18	11
Mail carried - - - -	0.15	0.48	2.8
Passengers carried - - - -	426	604	1,688

The "Aero" Company also operated its Prague—Marienbad line. Statistics for 1926 as compared with 1925 are as follows :—

	1925 (twice daily).	1926 (once daily).
Number of miles flown - - - -	28,750	22,770
Goods carried (tons, approx.) - -	2	4.8
Mail carried - - - -	0.11	0.07
Passengers carried - - - -	587	374

The negotiations entered into by the Czechoslovak Government with the Aircraft Operating Company, Ltd., for the establishment of Czechoslovak air lines have been continued, while negotiations have also been opened with Imperial Airways, Ltd., regarding the operation of a service between Cologne and Prague as an extension of the company's London—Cologne route.

An Air Traffic Agreement has been concluded between Czechoslovakia and Germany, one of the objects of which is an air service between Prague and Berlin.

The "Avia" works at Prague, founded in 1919 and hitherto owned by Messrs. Milos, Bondy and Coy., have recently been acquired by the Skoda Company. The "Avia B.H.II" light aeroplane manufactured by this factory has met with considerable success during the past year, notably the winning of the Coppa d'Italia and the taking of 1st and 2nd places in the French competition for low consumption aircraft.

DENMARK.

An air traffic Council has been set up under the Minister of Communications. The members of the council include the Chiefs of the Military and Naval Air Services.

The Danske Luftfartselskab has accepted an offer of 200,000 kroner of new preference capital in equal parts from the Danish National Bank and the East Asiatic Co., of Copenhagen, who, in addition, are understood to have undertaken jointly to

increase the capital by 100,000 kroner per year for the next three years provided a State subsidy of a similar amount is continued during the same period. The new Board will include representatives of the Ministry of Trade, the Merchants' Guild, the National Bank, the East Asiatic Co., and the Copenhagen Municipality.

In 1926, the company operated over the routes Copenhagen—Hamburg—Cologne, and Copenhagen—Hamburg. The traffic figures for the year were :—

126,730 miles flown (127,018 during 1925).

1,032 passengers carried (1,128 during 1925).

26·37 tons goods carried (16·85 during 1925).

1·05 tons mails carried (2·60 during 1925).

The decrease in the number of passengers carried is attributed by the company to delays in the delivery of new aircraft.

FINLAND.

An air service between Helsingfors and Stockholm was operated alternately by the Swedish A.B. Aerotransport and the Finnish Aero O/Y during the period 1st June—30th September, 1926. The Helsingfors—Reval service, which was subsidised by the Finnish Government to the extent of 300,000 Finnish marks, was operated by the Aero O/Y in conjunction with the Esthonian "Aeronaut" Company daily throughout the year, with the exception of an interruption of three weeks in April and a temporary suspension at the beginning of November in order to prepare the machines for the winter service. The following statistics for 1926 show in every case a considerable increase over the corresponding figures for 1925.

	Passengers.	Mail. In tons.	Goods and Luggage. In tons.
Helsingfors—Stockholm - - -	699	2	11
Helsingfors—Reval - - -	2,292	8½	30

FRANCE.

Chiefly on grounds of economy, the administration of civil aviation has been completely reorganised. The Under-Secretariat of State for Aeronautics and Air Transport has been suppressed, and its place taken by a Directorate-General under the authority of the Minister of Commerce and Industry. The arrangement whereby the development and construction of new aircraft for the military and naval air services is controlled by the civil aviation administration has been retained.

The Directorate-General comprises :—

- (1) A Directorate of aircraft construction.
- (2) A Directorate of airways and communications.
- (3) A Directorate of personnel and accounts.

In addition there is a secretariat and intelligence branch directly under the Director-General.

The three outside establishments of the Under-Secretariat, the S.N.Aé. (Service de la Navigation Aérienne), the S.F.Aé. (Service des Fabrications de l'Aéronautique) and the S.T.Aé. (Service Technique de l'Aéronautique) are now reduced to two, the S.F.Aé. and the S.T.Aé. having been amalgamated under the title "Service Technique et Industriel de l'Aéronautique."

The total vote for Civil Aviation for 1926 amounted to 142,679,190 francs. The corresponding vote for the previous year was 152,581,700 francs, and thus a reduction of approximately 10,000,000 francs was affected. The subsidy vote for 1926 was, however, larger than in the previous year, the sum allotted to air transport companies being 60,500,000 francs, as against 51,610,000 francs for 1925. In addition to this amount in 1926, 1,375,000 francs were devoted to the general development of aviation, and 5,375,000 francs were allotted towards the cost of operating the civilian-operated training schools. For 1927, the estimated total civil aviation vote is 169,194,636 francs, of which sum 78,650,000 francs is earmarked for subsidies to air transport companies.

An agreement with Germany was signed on May 22nd, as a result of which an air service has been opened between Paris and Berlin via Cologne and Essen. This service is operated by two companies, the French Compagnie Générale de Transport Aériens, and the Deutsche Luft Hansa, each responsible for a journey in each direction three times weekly, thus making a daily service.

A further result of this settlement has been the resumption of the C.I.D.N.A. service from Paris to Warsaw and Constantinople, via Strasburg and Prague, further intermediary landings now being made at Nuremburg and Breslau, in Germany. The machines confiscated in the past by Germany have also been returned to the C.I.D.N.A. The Company has not yet been successful in extending its services into Asia, but has extended its activities in another direction by the opening of a flying school at La Brayelle (Douai) for the initial training of military and civil pilots and for refresher training of reserve pilots. Including one school in Algeria, there are now eleven of these schools.

The Cie. Générale de Transports Aériens (Farman), in addition to the Paris-Berlin service already mentioned, operated its usual service from Paris to Amsterdam, via Brussels, connecting with the Swedish Aero-Transport service to Hamburg, Copenhagen and Malmo. Similarly, the Paris-Berlin service links at Cologne with the service to Copenhagen and Malmo operated by the Danish company Det Danske Luftfartselskab.

The Cie. Générale d'Entreprise Aéronautiques (Latecoere) is proceeding with the development of a service to South America, and now carries passengers on the section Casablanca-Dakar.

Passengers are also now carried from Alicante to Oran. Both of these sections have in the past been restricted to the carriage of mails only, the former operating weekly and the latter four times weekly in each direction. The number of letters carried on this system in 1926 was 6,149,489.

The Cie. Air Union, besides maintaining its Paris-London service, opened on 1st June, 1926, a service from London to Marseilles, via Paris and Lyons, with a branch line from Lyons to Geneva. The company intends to inaugurate night flying on this route during 1927.

The service Antibes-Ajaccio, hitherto operated by Cie. Aeronavale, was taken over by the Air Union in October, when the two companies were amalgamated. It is proposed to make Marseilles the French terminal instead of Antibes, and trial flights have recently been carried out over the extension Ajaccio-Tunis.

A new direct seaplane service between Marseilles and Algiers has been recently opened, and is being operated experimentally. The distance of approximately 500 miles is covered in about 6 hours. The operating concern is known as the Cie. Aérienne France-Algerie, in which the Latecoere concern has large interests.

The Cie. Messageries Transaériennes has revived the scheme for a seaplane service from Marseilles to Alexandretta (Syria) with intermediary landings at Corfu and Athens. A subsidy of 1,500,000 francs has been provided by the French Government for preliminary work in 1927.

Statistics of French regular air traffic 1924-1926 are given in the following table. As from 1926 the passenger-kilometre and metric ton-kilometre are being adopted as the units for statistics, and figures are given for 1926 on this basis (converted to English units) as well as on the former "stage" basis.

—	Miles Flown.	Passengers Carried.	Goods and Mails Carried. Tons.
		By Stages.	By Stages.
1924	2,249,000	16,277	1,515
1925	2,946,000	19,768	1,810
1926	3,243,900	18,861	1,636.5
		Passenger-miles.	Ton-miles.
1926	—	4,096,050	340,460

The French Government repeated during 1926 its offer of prizes to French constructors of machines who succeed in establishing and retaining the principal world's air records, and set aside the sum of 700,000 francs for this purpose.

A competition for low-consumption aircraft was held at Orly from 9th until 15th August, and resulted in first and second places being obtained by two Czecho-Slovakian machines, type

Avia B.H.II. The chief prizes were: 1st, 40,000 francs; 2nd, 20,000 francs; 3rd, 15,000 francs.

The multi-engined seaplane competition, held from 19th July to 7th August 1926, was limited to French machines. There were only two entries, a "Lioré et Olivier" type 15, 3 engined, and a machine entered by the Société Provençale de Constructions Aéronautiques, type "Météore 63." The latter, fitted with 3 engines (380 h.p. French built "Jupiter"), won the first prize of approximately 452,000 francs, the Lioré et Olivier winning 223,000 francs.

An officer of the French Naval Air Service, Lieut. Bernard, starting from Marseilles on 12th October, carried out a remarkable flight to Madagascar and back to France on a Lioré et Olivier H. 190 flying boat equipped with a French built "Jupiter" engine. The total distance flown was about 17,500 miles, a great proportion of which was over the interior of Africa, following the course of waterways. (The return flight was completed at Paris on 14th January 1927.)

Amongst other important flights carried out by French pilots during 1926 may be mentioned:—

Paris-Pekin, 6,520 miles.

Paris-Basra (non-stop), 2,695 miles.

Paris-Omsk (non-stop), 2,937 miles.

Paris-Bundar Abbas (non-stop), 3,250 miles.

Paris-Jask, Persia (non-stop), 3,390 miles.

GERMANY.

The total civil aviation votes for 1926, including supplementary votes, and the Estimates for 1927, have been reported as follows:—

	Votes 1926. Reich Marks.	Estimates 1927. Reich Marks.
1. Aerodrome W/T Stations - - -	485,000	950,000
2. Exhibitions and competitions - - -	2,000,000	2,000,000
3. Meteorological Services - - -	1,290,000	1,800,000
4. Scientific Development and advances in general efficiency - - -	16,000,000	8,700,000
5. Adlershof Experimental Station - - -	1,950,000	2,700,000
6. Air Transport subsidies - - -	15,571,500	19,750,000
7. Appliances for increasing the safety of air navigation. Production of maps and plans - - -	4,350,000	3,000,000
8. Glider and light aeroplane movement and the training of professional personnel - - -	5,100,000	4,700,000
9. Contribution to the Aerodynamics Experimental Establishment at Gottingen - - -	100,000	200,000
10. Contribution to the aircraft museum	3,500	3,500
Total Reich Marks - - -	46,850,000	43,803,500
= approx.	(£2,286,000)	(£2,137,000)

The organisation of the new German air traffic combine, the Deutsche Luft Hansa A.G., was sufficiently far advanced to enable the company to commence operations on 1st April, as arranged, but was not finally completed until 15th June, when at the first general meeting of the company, the provisional capital of 50,000 marks was increased to 25,000,000 marks and a board of directors, consisting of Direktor Dr. E. G. von Stauss (President), and 63 other members, was elected.

During the summer of 1926, the Luft Hansa, in conjunction with the various local companies and with certain foreign companies, operated some 50 services. The internal network, with the exception of some simplifications and a few additions, was substantially the same as that operated by the various companies in 1925, but certain changes were made in the routes radiating abroad. As a result of the Franco-German Air Convention a through service between Berlin and Paris was inaugurated. Night flying on the Berlin-Königsberg section of the Berlin-Moscow route was introduced and successfully maintained, enabling the whole journey in either direction to be completed in one day. The Königsberg-Helsingfors line formerly operated by the Junkers "Europa Union" was, however, discontinued. The total length of the German airway system in the summer of 1926 was 12,680 miles, as compared with 10,920 miles in 1925. During October, the most ambitious winter programme yet attempted by Germany, consisting of about 30 of the more important lines, was brought into operation. The following statistics have been published for the period 1st April-31st December, 1926.

Miles flown	-	-	-	-	-	-	3,816,144
Passengers carried	-	-	-	-	-	-	56,268
Baggage	-	-	-	-	-	-	378 tons.
Freight	-	-	-	-	-	-	254.5 „
Mails and newspapers	-	-	-	-	-	-	297 „

The mileage flown shows an increase of about 741,000 over the published figure for the whole of 1925, but comparison under the other headings is more difficult owing to the fact that whereas in 1925 both passengers and goods were counted according to the number of "stages" covered, complete journeys only were taken into consideration in arriving at the figures for 1926. It is stated, however, that after the necessary allowances have been made for this difference in the system of calculation, the number of passengers carried shows an increase of 50.3 per cent. over the figure for 1925, while baggage and freight shows an increase of 115 per cent. and mails and newspapers an increase of 86.4 per cent.

In accordance with an agreement entered into with the Reich, the Luft Hansa received in respect of each kilometre flown over an approved main route a subsidy of two marks, consisting of

1.40 marks to cover operating losses and 0.60 marks for the purchase and replacement of material. In the case of some routes of lesser importance 50 per cent. of the subsidy was contributed by the Reich and the balance was made up by contributions from the various States and Municipalities, while some comparatively unimportant feeder lines were subsidised entirely by the local authorities and aerodrome companies concerned.

The summer time-table for 1927 has not yet been published. It is anticipated that few alterations will be made in the internal network, but several new international lines are proposed. One of the most important is a line from Berlin to Rome via Munich and Milan, the Berlin-Munich section to be operated by the Luft Hansa, the Milan-Rome section by the new Italian Aero Lloyd Company and the difficult transalpine section by both companies. As a result of successful negotiations between Germany and Czecho-Slovakia, the Chemnitz and Dresden lines are to be extended to Prague and Vienna, while other proposed extensions over Czecho-Slovak territory are from Breslau to Prague and on to Munich and from Gleiwitz to Vienna.

With the co-operation of Swiss and French companies connection was maintained last summer between Frankfurt and Marseilles via Basle, and it is now proposed to make Copenhagen the northerly terminus and to extend the line southward to Barcelona and Madrid, the latter extension to be operated jointly by the Deutsche Luft Hansa and a new Spanish company. Other proposals for 1927 include a flying boat service, Cologne-Duisburg-Rotterdam, and an alteration of the Moscow service to run via Riga instead of Kovno, with a connection from Riga to Reval and Helsingfors. With regard to less definite schemes for the future, the Luft Hansa carried out during 1926 a successful survey of the proposed Berlin-Peking route and further experimental flights are planned for the coming summer. Another scheme in connection with which a certain amount of preliminary work has been done provides for a seaplane service across the North Sea to England. Finally, enquiries have been undertaken in Iceland with a view to investigating the possibilities of a service between Germany and N. America via Scotland and Iceland.

Three of the four main prizes in the German seaplane competition held during last summer were won by a Heinkel H.E.S. machine fitted with a 450 h.p. Napier "Lion" engine, the remaining prize, competition for which was limited to machines fitted with German engines, being won by a Junkers W. 33 machine.

At the end of the year it was announced that the financial control exercised by the Government over the Junkers Flugzeugwerke, A.G., had been relinquished. Since the absorption of the Junkers air transport organisation into the Deutsche Luft Hansa, the Junkers company had become heavily in debt to the Government. It is understood that this debt has now been cancelled.

In addition to the agreement between Germany and France mentioned above, a similar air traffic agreement between Germany and Belgium was also concluded during the year.

HOLLAND.

The K.L.M. has continued its policy of expansion. During 1926 the Rotterdam-Amsterdam-Copenhagen service was extended to Malmo, connection being made at Amsterdam with the company's machines from London and Paris. A further extension of the service to Gothenburg is contemplated in 1927. Independent services were also operated from Amsterdam to London and Paris, the latter service connecting with the French service to Marseilles.

The statistics of Netherlands air traffic for 1926 as compared with 1925 are as follows :—

	1926.	1925.
Miles flown - - - -	597,500	679,753
Passengers carried - - -	5,616	5,051
Goods and mails carried, tons -	255	225

A new subsidy agreement (the previous agreement terminated at the end of 1926) is about to be concluded between the company and the Government. The new scheme, it is stated, will cover a period of eight years, and the total subsidy to be paid to the company during this period will amount to 3,000,000 florins. The Estimates for 1927 provide for a subsidy of 600,000 florins. One of the conditions imposed on the company is that additional private capital shall be raised. This, it is anticipated, will present little difficulty in view of the satisfactory progress made during the past few years. The cost of air transport in 1926 was 1.35 florins per metric ton/kilometre as compared with 4.60 florins in 1922. If the cost can be further reduced to 0.60 florins before the expiration of the new subsidy agreement, the company, it is stated, should be a paying concern without further subsidy.

It is expected that Holland will soon become a member of the International Air Convention. A new Air Navigation Act regulating air navigation in the Netherlands has been published.

The question of air transport in the Netherlands East Indies is receiving increased attention. It is reported that route survey flights are to be carried out by the N.E.I. Military Air Service and that the Government has set aside the sum of 20,000 florins to enable the Director of Government Industries to open a civil aviation section in his department.

ITALY.

Italy has made considerable progress during the year in the execution of her programme for setting up an air line system comparable with that of other countries. A sum of 30,330,000 lira

was voted for civil aviation in 1926-27, and of this 22,627,000 lira was allocated to subsidies for the new air lines. The following lines were put into operation:—

Brindisi-Athens-Lemnos-Constantinople (Societa Aero-Expresso Italiana). Seaplane service; commenced on 2nd August, 1926. Maintained irregularly.

Genoa-Rome Naples-Palermo (Societa Anonima Navigazione Aerea). Seaplane service; opened between Rome and Palermo on 7th April, 1926. Maintained three times weekly.

Turin-Venice-Trieste (Societa Italiana Servizi Aerei). Aeroplane service; operated three times weekly from 1st April, 1926, daily from 14th June and twice daily from 12th July until 15th October, upon which date it was suspended for the winter and replaced by the services:—

Trieste-Venice and *Trieste-Zara*. Operated daily as temporary winter services.

Venice-Vienna (Societa Transadriatica). Aeroplane service; opened 25th August, 1926, with a service three times weekly. A daily service was introduced in October, a stop being made on alternate days at Graz to connect with the line Graz-Budapest. This service is run in conjunction with the Oesterreichische Luftverkehr A.G. of Vienna.

Negotiations have taken place between the Deutsche Lufthansa, representing Germany, and a company entitled the Aero Lloyd Italiano, representing Italy, with a view to the establishment of air connections between the two countries next year. It is reported that these companies have agreed to run daily services on the route Rome-Milan-Munich-Berlin, providing the approval of their respective Governments is received.

An important change has been made in the status of the Italian Aero Club, upon which has been conferred certain administrative powers over civil aviation other than commercial operations. The club is to be governed by an administrative council which will include a representative of the Air Minister. In order to enable the Club to carry out its new duties it will receive a grant of 300,000 lira annually from the Government.

Italian aviation scored a notable success in winning the Schneider seaplane trophy from the United States, which country, having won the two previous contests, would have become the permanent holder of the trophy but for the Italian victory. The winning Italian machine, a Macchi type M. 39, piloted by Major de Bernardi, achieved a speed of $246\frac{1}{2}$ miles an hour, an increase of 14 m.p.h. over the United States winner in 1925.

NORWAY.

The civil aviation vote for 1926-27 was 25,000 kroner, of which 10,000 kroner was required to cover administrative expenses and the remaining 15,000 kroner was granted to assist the con-

struction of a seaplane station at the island of Graesholmen, Oslo. The municipality of Oslo granted a similar sum for this purpose. No air transport services were operated during 1926.

POLAND.

The civil aviation vote for 1926 amounted to 3,500,000 zlotys, of which sum 2,000,000 zlotys were allotted to subsidies.

The Polski Aerolot has augmented its services during the past year, and now operates the following lines :—

- (1) Danzig-Warsaw-Lemberg.
- (2) Lemberg-Cracow-Vienna.
- (3) Warsaw-Lodz-Cracow (direct service Warsaw-Cracow occasionally).

A service is proposed also between Lemberg and Czernowicz, to be extended ultimately to Bucharest. In addition, trial flights were again carried out over the route Warsaw-Copenhagen, via Puck, and it is hoped that a regular service over this route will be commenced in 1927.

The "Aero" Company of Posen has recommenced its service between Posen and Warsaw.

The Skoda Company, a Czechoslovak concern, has recently acquired a controlling interest in a Polish aircraft factory, the Zakłady Lotnicze Frankopol of Okencin, near Warsaw. This factory has been inactive for a considerable time.

With regard to the training of pilots, two civil schools have been opened this year by the Polish Air Defence League, one at Posen and the other at Warsaw.

SOVIET RUSSIA.

During the year the "Deruluft" Company extended its Königsberg-Moscow service to Kharkov, the Moscow-Kharkov section being carried out in conjunction with the "Ukrvozdukhput." This extension of service enabled the company to cover approximately 311,000 miles between 1st May and 31st October, when the service was suspended for the winter. In this period there were only six forced landings, and only once was a machine seriously damaged. The regularity of the scheduled flights was given as 99.6 per cent. During 1927 it is intended to take over the route from Königsberg to Berlin which has hitherto been operated by the Deutsche Luft Hansa. This route will continue to be flown by night in order that the whole journey from Berlin to Moscow may be completed within the twenty-four hours.

Regular services have been operated during the year by the "Dobrolet" Company on the following routes :—

- Kagan (New Bokhara)-Khiva-Tashauz.
- Kagan-Termes-Diushambe.

A service also appears to have been working on the route Verkhny Udinsk (on the Trans-Siberian Railway)—Ulan Bator (Urga). This is a section of a proposed route to Peking.

The "Ukrvozdrukput" during 1926 operated on the route Moscow—Orel—Kharkov—Artemovsk—Rostov on Don—Mineral Waters—Grozny—Baku—Tiflis. It is hoped to extend this route into Persia.

Several long distance flights were organised during 1926, including :—

1. Moscow—Kharkov—Rostov—Baku—Enzeli—Tehran—Enzeli—Baku—Kharkov—Moscow.
2. Moscow—Konigsberg—Berlin—Paris—Moscow. (The return journey from Paris to Moscow was flown in one day.)
3. Moscow—Kharkov—Sevastopol—Rostov on Don—Lipetsk—Vitebsk—Moscow.

The membership of the "Aviokhim" Society during 1926 showed no tendency to increase. Between July 1st, 1925, and May 1st, 1926, the amount of money collected and handed over to the central offices of the "Aviokhim" was 1,041,641 roubles.

SPAIN.

A Congress was held at Madrid in October for the purpose of setting up an Ibero-American Air Navigation Convention. Spain, Portugal, and all the States of Central and South America took part, and it was agreed to draw up a Convention on the general lines of the International Convention for Air Navigation signed at Paris. A Spanish-American air traffic union, headed by Spain, was envisaged at this Congress.

Commandante Herrera's scheme for a service with Zeppelin airships between Spain and South America is still being pursued. An airship that will be capable of flights on this route has already been laid down in Germany by the Zeppelin Company.

In December, a formation of three Dornier "Wal" flying boats of the Spanish Naval Air Service flew from Mellita (Morocco) to Fernando Po (Spanish Guinea), a distance of 4,400 miles. Interest in this flight is enhanced by the fact that British Rolls-Royce engines were fitted to the machines and that, excepting an interruption of six days due to bad weather, the nine stages of the journey were flown, as scheduled, on consecutive days.

SWEDEN.

The following grants for the promotion of air traffic were voted for the year 1926-27 :—

- (1) 500,000 kroner as a subsidy for regular air traffic.
- (2) 500,000 kroner as capital for the aviation loan fund.
- (3) 32,000 kroner for the improvement of the Bulltofta aerodrome, near Malmo.

The air traffic subsidy to the A/B Aerotransport was granted on practically the same lines as in 1925. The stipulation as to Norwegian participation on the Gothenburg-Oslo route was, however, withdrawn.

The A/B Aerotransport recommenced operations on 19th April, 1926, with the re-opening of the Malmo-Amsterdam service. As from 15th July the company shared with the Deutsche Luft Hansa the operation of this service and a service between Malmo and Berlin. The Stockholm-Helsingfors and Gothenburg-Copenhagen-Malmo services opened on 1st June and 1st July respectively, but the connection with Oslo had again to be deferred. All services have been closed for the winter.

An agreement has been concluded between the company and the Swedish State Railways for the transport of parcels and express freight by a combined air and rail service between various Swedish railway stations on the one hand and the aerodromes at Berlin, Amsterdam, Paris and London on the other.

The Nordiska Flygrederiet, owing to the refusal of a Government subsidy, did not operate a service during 1926.

The Committee appointed in November, 1924, at Malmo to make investigations as to the construction of a permanent station for landplanes and seaplanes has now submitted its report. It is suggested that a new station should be constructed at a total cost of 1,212,600 kroners, including the cost of removing hangars, &c. from Bulltofta, the present temporary station. The cost of converting Bulltofta into a permanent station is estimated at 1,141,000 kroner.

SWITZERLAND.

The following regular services were operated by Swiss air transport companies during 1926; those marked with an asterisk being wholly or partly new :—

1. Geneva-Lausanne-Zurich ("Ad Astra," 3rd May-30th September).
2. Zurich-Stuttgart(-Hamburg) ("Ad Astra," 12th April-15th October).
3. Basle-Stuttgart(-Berlin) ("Balair," 12th April-30th September).
4. *Basle-Karlsruhe-Frankfurt ("Balair," 19th April-30th September).
5. *Basle-La Chaux-de-Fonds ("Balair," 17th May-31st August).
6. *Basle-Geneva-Lyons-Marseilles ("Balair," 24th May-30th September).
7. *Basle-Zurich(-Munich-Vienna) ("Balair," 19th April-8th May).
8. Basle-Lausanne-Geneva ("Balair," 1st-22nd October).

During the course of regular scheduled flights over the above routes 2,345 passengers, 20 tons of mails and 7½ tons of freight

were carried, while the total distance flown was 210,340 miles. There was not, during the whole of the 1926 flying season, any accident causing death or injury to passengers. In spite of the bad weather experienced at the beginning of the season 96 per cent. of the scheduled flights were completed, as compared with 87.5 per cent. for 1925. In addition to the regular services enumerated above, a special touring service, Zurich-Lucerne-Interlaken, was operated with seaplanes belonging to Comte et Cie., and services between Basle and Berne and between Basle and Lucerne were operated respectively by the "Aviatik bei der Basel" and "Balair" companies, on request.

The "Balair" company was formed at Basle on the 23rd September, 1925, with a share capital of 100,000 Swiss francs, the majority of which is held by Basle business men. The fleet of the company consists of five Fokker FIII 5-seater monoplanes which were acquired from the K.L.M. and one Fokker-Grulich FII.

A sum of 100,000 francs, which was subsequently increased to 150,000 francs, was voted by the Federal Government for the assistance of civil aviation during 1926 and, in addition, financial assistance was again forthcoming from the Post Office and the various cantons and towns.

ASIA.

JAPAN.

A Japanese company, the Japan Aviation Company, has conducted trial flights between Osaka and China, with a view to the establishment of regular services. The first attempt was made towards the end of September, when a successful flight was made from Osaka to Dairen and back, *via* Hiroshima and Seoul, and this was followed up early in October by a flight of two seaplanes from Osaka to Shanghai *via* Fukuoka and Mokpo.

According to newspaper reports further experimental flights are to be made and, if the Japanese Diet sanctions the proposed subsidies, it is hoped to start regular services in 1927. In the first instance only mails are to be carried, and the transportation of passengers is not to be undertaken until 1930. Services are to be established first between Osaka, Dairen and Shanghai, but later on it is hoped to link up also with Formosa, Foochow, and possibly Vladivostock.

AMERICA.

ARGENTINA.

The work of the Civil Aviation Directorate under the Ministry of War consists chiefly of the training of suitable civilians to provide a reserve of pilots in case of need. The training is done through numerous local Aero Clubs situated in or near the principal towns throughout the country. Government assistance generally takes the form of a subsidy for each pilot trained, the provision of aircraft on easy terms, and the loan of instructors, &c.

Interest is growing in the possibilities of light aeroplanes for private and club flying, and demonstrations by the De Havilland "Moth" machine which has been sent to Argentina will undoubtedly have excellent results in convincing interested parties of the efficiency and convenience of the light aeroplane. Argentine conditions are favourable for the extensive development of private flying.

The Junkers Company have continued to operate the air mail and passenger service between Buenos Aires and Montevideo and, in September, 1925, their contract with the Government, under which they receive a small subsidy, was renewed for a further period of three months.

Experiments have begun in destroying locusts by insecticides sprayed from aeroplanes.

BOLIVIA.

The Lloyd Aero Boliviano, a company formed by the Junkers Mission, has been granted a concession for the operation of air lines for a period of six years.

The company operates a somewhat irregular service between Cochabamba and Santa Cruz and is organising an extension to Trinidad (Bolivia).

BRAZIL.

In April, 1926, the Federal Government instituted a Bureau of Air Navigation to take charge of all commercial air services.

The State of Minas Geraes has called for tenders for operating a commercial air service between the capital of the State, Bello Horizonte, and Rio de Janeiro, and four firms have submitted proposals.

An air transport company entitled the "Empresa Aerea Rio Grandense," is to be formed with the intention of operating services in the State of Rio Grande do Sul. It is proposed to use German aircraft and to operate three services, namely :—

Porto Alegre—Pelotas—Rio Grande.

Porto Alegre—Santa Maria.

Porto Alegre—Bathing beaches (Atlantic coast).

CHILE.

On 28th November, 1926, a Decree was issued regulating aerial navigation.

M. Luis Testart, who obtained a concession for the establishment of various air lines, presented his proposals to the Ministry of Public Works in June last, within the time specified by the Decree. These plans are now being studied by the Inspectorate of Aviation in the Ministry of War.

COLOMBIA.

The Condor Syndicate, which has previously been mentioned in connection with the S.C.A.D.T.A. of Colombia, has concluded an agreement with the Government of Guatemala regarding the inclusion of that country in a circular seaplane service between the Isthmus of Panama and the town of Havana or a port in the United States of America. The syndicate is authorised to establish commercial air lines within Guatemala in connection with this service. It is reported that a similar agreement has been signed also with the Government of Nicaragua.

The S.C.A.D.T.A. continue to operate their Colombian services with regularity.

The Andian National Corporation Ltd., an oil concern, has purchased a Sikorsky 32 aircraft and placed it in service on the Magdalena River for carrying correspondence and personnel from Cartagena to the oil field, a distance of about 350 miles. The trip is made in about three hours, whereas previously, the time occupied on the journey was about a week.

U.S.A.

The Civil Aviation Bill introduced by Senator Bingham became law on 26th May, 1926, and is known as the "Air Commerce Act of 1926." In accordance with its provisions, a Bureau of Commercial Aviation has been established within the Department of Commerce in the charge of a new Assistant-Secretary of Commerce, who is to be responsible for the issue of general regulations governing air traffic, the registration of machines and issue of certificates of airworthiness and pilots' licences, and for the general development of civil aviation.

In addition the Bureau will be responsible for the control and co-ordination of the various services which are to be carried out by other departments in connection with the furthering of air navigation facilities. Of these services, investigations with a view to the perfection of navigational aids such as lighting systems and radio direction finding will be conducted by a new division of the Bureau of Standards acting in co-operation with the Guggenheim foundation, the Army Air Service and other governmental agencies. The mapping of air routes will be undertaken by a new division of the Coast and Geodetic Survey department, while a new division to be established in the Bureau of Lighthouses will be responsible for work previously done by the Post Office in connection with lighting and marking the air mail routes and the establishment of emergency landing grounds.

A sum of \$550,000 has been provided for the year 1926-27, \$250,000 of which is for the general administration expenses of the Bureau, while the remaining \$300,000 is to be used for the establishment of aids to air navigation, the organisation of

additional air mail routes and the construction and operation of the necessary lighting, radio and other signalling and communicating apparatus. Of the 9,745 miles of airways now in operation or proposed for the near future, 2,041 miles are already equipped with lighting apparatus and the Bureau hopes to light a further 1,167 miles during the current fiscal year.

The following air mail routes are now in actual operation :—

	Miles.	Date opened.
<i>Post Office routes :</i>		
New York—San Francisco - - - -	2,665	8/9/20
New York—Chicago (night service) - - -	770	1/7/25
<i>Contract routes :</i>		
New York—Boston - - - - -	220	1/7/26
Chicago—St. Louis - - - - -	277	15/4/26
Chicago—St. Paul—Minneapolis - - - -	384	7/6/26
Chicago—Detroit—Cleveland - - - - -	369	15/2/26
Chicago—Dallas—Forth Worth - - - - -	995	12/5/26
Salt Lake City—Los Angeles - - - - -	589	17/4/26
Elko—Pasco - - - - -	424	6/4/26
Atlanta—Miami - - - - -	740	1/4/26
Cheyenne—Pueblo - - - - -	200	31/5/26
Detroit—Grand Rapids - - - - -	140	31/7/26
Juneau—Petersburg (Alaska) - - - - -	115	1/7/26
Seattle—Victoria - - - - -	78	15/10/20
Seattle—Los Angeles - - - - -	1,073	15/9/26
New Orleans—Pilottown - - - - -	80	1923
Total - - - - -	9,119	—

During 1926, up to the end of December, the total traffic carried out on these routes was as follows :—

	Miles flown.	Mails carried.	Passengers carried.
		Lbs.	
Post Office routes - - - -	2,292,263	433,649	—
Contract routes (approx.) - - -	2,115,000	376,205	6,000

For the present the operation of the transcontinental through service and New York—Chicago night service remains in the hands of the Post Office, but steps are being taken to transfer these services to a contractor at an early date. The contractors do not receive a subsidy but are paid a proportion, usually about 80 per cent., of the air mail surtaxes collected by the Post Office. With a view to encouraging the use of the air mail system a flat rate of 10 cts. per oz. is to be charged for air conveyance of letters over any distance. Hitherto the rate has been fixed

according to the number of stages flown and this basis has not been well understood.

Every branch of civil aviation in the United States has progressed rapidly during 1926. The experimental phase has almost passed and air activities of all kinds, for which boundless opportunities exist, are being energetically developed.

